RELEVANCE AND RELIABILITY IN AN EXPERIMENTAL LENDING ENVIRONMENT

BY

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In this study, bank credit analysts' tradeoff between relevance and reliability of financial information is examined. In particular, two factors are hypothesized to affect this tradeoff. One factor is the availability of a validating scheme to test the reliability of the information. The other factor is the overall level of informational reliability in the decision context. These factors were selected to be representative of two major classes of variables that can affect the analysts' tradeoff between relevance and reliability. These classes are information-specific variables and environmental variables.

The two factors were examined through a laboratory experiment involving fifty credit analysts from four major commercial banks in Florida. The analysts assigned credit ratings to a series of hypothetical firms seeking bank loans. Analysts assigned a credit rating to each firm before and after receiving additional information that differed in terms of relevance and reliability. Reliability was experimentally manipulated through the ability of management to bias the information favorably.

The principal results were (1) analysts were influenced by the higher-relevance additional information provided; (2) analyst responses were conditioned by the reliability of the additional information; (3) analysts employed validating schemes when possible to test the reliability of the information; (4) the validating scheme used most frequently by the analysts resembled a heuristic known as "adjustment from an anchor"; (5) the overall level of informational reliability in the decision context influenced analysts' responses, with reliability being attended to more in a low reliability environment than in a high reliability environment. This study provides evidence that two major classes of variables, information-specific and environmental variables, can affect the willingness of financial statement users to trade off relevance for reliability. This evidence should provide useful input to the accounting profession's ongoing effort to provide a reasonable balance between relevance and reliability in the standard-setting process.

CHAPTER I
INTRODUCTION AND RESEARCH PROBLEM

There has been a long-standing concern in the accounting profession that financial statements should provide information to users that is both needed for their decisions and dependable. For example, a set of financial statements containing highly dependable but largely irrelevant information would not be very useful. Neither would a set of financial statements containing needed information that is largely undependable. Both of these characteristics are necessary to the ultimate usefulness of the information.

The accounting profession has termed these two characteristics (qualities) of information _relevance_ and _reliability_. It is possible to trace the accounting profession's concern for these two characteristics from the authoritative pronouncements of the Committee on Accounting Procedure and Accounting Principles Board to those of the current Financial Accounting Standards Board (FASB). In doing so, one quickly realizes that almost every pronouncement is designed to enhance the usefulness of accounting information by improving the relevance and/or reliability of a disclosure or class of disclosures.

Unfortunately, an increase in one of these qualities is likely to be associated with a decrease in the other quality. For example, the FASB [1980] has stated that "relevance and reliability often impinge on each other. Reliability may suffer when an accounting method is changed to gain relevance and vice versa" [para. 90]. Given the potential for such an inverse relationship, how is the FASB to know if the potential tradeoff between relevance and reliability inherent in any possible new standard improves the usefulness of the information in the eyes of the user? Knowledge about such a tradeoff function should be very helpful to members of the FASB.

The purpose of this study is to accumulate information about factors which influence a user's tradeoff function. A user's tradeoff function can be decomposed into two separate parts: (1) the addition of a new accounting disclosure and (2) the deletion of an old disclosure. The research concentrates on the first part of the tradeoff function: the addition of a new disclosure. The second part of the decomposition, the deletion of the old disclosure, is left for future research. In this study, the additional new disclosure is high in relevance and low in reliability while the old disclosure is high in reliability and low in relevance. I look at one particular user group, bankers, and one decision context, the assessment of credit worthiness. Evidence from this study provides information about how certain factors influence the user's reaction to the potential relevance/reliability tradeoff. This evidence can serve as useful input to the FASB in its ongoing effort to provide a reasonable balance between relevance and reliability in the standard-setting process.

Background

From its inception, the FASB has undertaken a massive effort to establish a conceptual framework for financial accounting and reporting. The project was envisioned as a set of documents promulgated over an extended period of time and designed to guide future standard-setting efforts. Early pronouncements in the project, such as the Statements of Financial Accounting Concepts, were intended to be very general and formative while later ones were to be situation specific.

The concepts of relevance and reliability emerged as cornerstones of the FASB's conceptual framework in *Statement of Financial Accounting Concepts No. 2: Qualitative Characteristics of Accounting Information* (SFAC No. 2), issued in May 1980. The Board's principal conclusions in this Statement included the following:

> The characteristics of information that make it a desirable commodity can be viewed as a hierarchy of qualities with usefulness for decision making of most importance. [p. ix]
>
> Relevance and reliability are the two primary qualities that make accounting information useful for decision making . . . If either of those qualities is completely missing, the information

> will not be useful. Though, ideally, the choice of an accounting alternative should produce information that is both reliable and more relevant, it may be necessary to sacrifice some of one quality for a gain in another. [p. x, emphasis added]

Relevance and reliability are defined as follows in SFAC No. 2:

> Relevance
>
> The capacity of information to make a difference in a decision by helping users to form predictions about the outcome of past, present, and future events or to confirm or correct prior expectations. [p. xvi]
>
> Reliability
>
> The quality of information that assures that information is reasonably free from error and bias and faithfully represents what it purports to represent. [p. xvi]

Since the entire conceptual framework project is intended to provide guidance in choosing among alternative financial accounting disclosures, the role of relevance and reliability in the selection process is critical. Consider, for example, a new accounting disclosure that can be implemented costlessly. Other things being equal, such a disclosure would be considered preferable to an existing disclosure if it yielded information that was more reliable without sacrificing relevance. Conversely, the new disclosure would also be preferable if it yielded information that was more relevant without sacrificing reliability. Preferability may be indeterminate if the new disclosure caused an increase in one quality and a decrease in the other.

For example, it is often claimed that current cost accounting is more relevant than historical cost but less reliable. Even if it could be implemented costlessly, current cost information can yield a net increase in usefulness only if its increased relevance outweighs its lower reliability. To reach a conclusion as to the preferability[1] of current cost information, a tradeoff function between relevance and reliability would have to be specified. This tradeoff function would tell us how much of a decrease in the reliability of the accounting data is acceptable to achieve a given increase in relevance with no net change in usefulness. In other words, how much reliability is the user willing to "trade off" for a gain in relevance? If the decrease in reliability is less than that indicated by the tradeoff function, then a net increase in usefulness would result from the implementation of current cost accounting. It is likely that there will be separate tradeoff functions for different types of disclosures and decision contexts. For instance, the user may be unwilling to trade off reliability for a gain in relevance for one disclosure but quite willing to do so for another disclosure. This research attempts to isolate and examine factors which explain such user reactions.

---

[1] "Preferability" implies that a consensus of users can be reached. Given the diversity of user perceptions and decision contexts, a consensus is probably not possible on all potential accounting standards. This is an inherent weakness in the notion of general purpose financial reporting. Any choice of one disclosure over another will most likely leave some users better off and others worse off. Accounting standard selection is not optimal in the Pareto sense [Demski, 1974].

Research Problem

For the purposes of this discussion, assume that relevance and reliability can take on two values: high and low. The four possible configurations of relevance and reliability are shown in Figure 1. The symbol "P" refers to some quantitative measure of preferability.

		Reliability	
		Low	High
Relevance	Low	P1	P3
	High	P2	P4

Figure 1: Configurations of Relevance & Reliability

I expect that information that is high in relevance and high in reliability (P4) will have the highest level of usefulness. Conversely, information that is low in relevance and reliability (P1) will have the lowest level of usefulness. However, the relationship between low relevance and high reliability information (P3) and high relevance and low reliability information (P2) is unclear. If the user were given a choice, would he select an accounting disclosure that is low in relevance but high in reliability over an accounting disclosure with the opposite qualities? The factors that influence the user's choice in such situations are the primary interest in this research.

Examining the tradeoff function as two separate decisions, the addition of a new disclosure and the deletion of the former disclosure, will help to clarify the issues. This "marginal" analysis also reflects the way the standard-setting process works in practice. Assume that a low relevance, high reliability disclosure is the current disclosure method and another disclosure that is high in relevance and low in reliability is available at some non-trivial cost. The first decision facing the user is whether to accept the new disclosure. The second decision is whether to reject the original disclosure. In choosing whether to accept the new disclosure, the user must decide whether the marginal usefulness of the new disclosure, given that the old disclosure is already available, is worth the additional cost. The marginal usefulness of the new disclosure can be viewed in terms of the potential impact it might have on the user's decision. There are three possibilities:

1. The user has no expectation of impact, indicating that the new disclosure has no marginal usefulness.
2. The user has an expectation of an impact indicating that the new disclosure has marginal usefulness, but this benefit is less than the new disclosure's cost.
3. The user has an expectation of an impact, implying that the new disclosure has marginal usefulness, and this benefit is greater than the new disclosure's cost.

The user would choose the new disclosure only in the third case, when the expected benefit is greater than the cost.

A disclosure that has no expected impact on the user's decision has no marginal usefulness. If there is an expected impact on the user's decision, the benefit of the impact would be weighed against the disclosure's cost to determine whether the disclosure should be undertaken.[2] The user's assessment of the disclosure's impact on the decision implicitly incorporates the user's preference for reliability or relevance at the expense of the other quality.

To formally examine the tradeoff decision further, let MU(P2|P3) be the marginal usefulness of P2 given that P3 is the existing disclosure and let U(P3) be the usefulness of the P3 disclosure by itself. The user will add P2 if

---

[2] A negative impact on the decision might result if the user misevaluated the reliability of the new disclosure (i.e., overestimated its reliability). This possibility is ignored in the following discussions.

$MU(P2|P3) >$ marginal cost of $P2|P3$, and will then delete P3 if $MU(P3|P2) <$ marginal cost of $P3|P2$. For example, P2 might be a current cost disclosure that is added to an existing historical cost disclosure because it has marginal usefulness in excess of its marginal cost. In conjunction with P3, P2 would be considered a supplementary disclosure. But P3 would be eliminated if its marginal usefulness was less than its marginal cost and P2 would become the primary disclosure.

The total usefulness of P3 and P2 together is constant, regardless of which of the two is added last. This can be represented symbolically as

$$U(P3) + MU(P2|P3) = U(P2) + MU(P3|P2)$$

Now assume equal costs for P3 and P2, and equal costs for $P3|P2$ and $P2|P3$. If only one disclosure can be cost-justified, the user will choose P2 if $U(P2) > U(P3)$, which also implies $MU(P2|P3) > MU(P3|P2)$. This research concentrates on the $MU(P2|P3)$ side of the decision: the marginal usefulness of disclosure P2 being added to the existing disclosure, P3. Viewing the user's tradeoff as two separate actions, adding a new disclosure and deleting an old disclosure, allows me to examine $MU(P2|P3)$ independently of $MU(P3|P2)$.

The information user's decision process in evaluating the usefulness of an accounting disclosure as a function of its relevance and reliability can be represented as a decision tree. Figure 2 depicts the possible relationships. In accordance with previous discussions, relevance is judged first by the user and assumed to be either high or low. Next, each level of relevance is judged to be of either high or low reliability on the basis of the disclosure's perceived freedom from error, freedom from bias, and representational faithfulness. This results in the four levels of usefulness, P1 through P4, that were discussed earlier. They are designated "preliminary usefulness levels"[3] in Figure 2 because at this point they do not incorporate the information-specific and/or environmental variables that could possibly influence the user's final determination of usefulness.[4]

The following is a list of information-specific variables, which vary according to the reported information, that could influence the user's final usefulness level:

1. Importance of reliability to usefulness--does the user view reliability as an important component of usefulness for this type of information?

---

[3] SFAC No. 2 does not use the terms "preliminary" and "final" usefulness levels, but it does acknowledge that each user determines his own usefulness level for accounting information, which is what the preliminary-final dichotomy implies: "In the last analysis, each decision maker judges what accounting information is useful, and that judgment is influenced by factors such as the decisions to be made, the methods of decision making to be used, the information already possessed or obtainable from other sources, and the decision maker's capacity (alone or with professional help) to process the information" [para. 36].

[4] Nor do they consider the costs of disclosure.

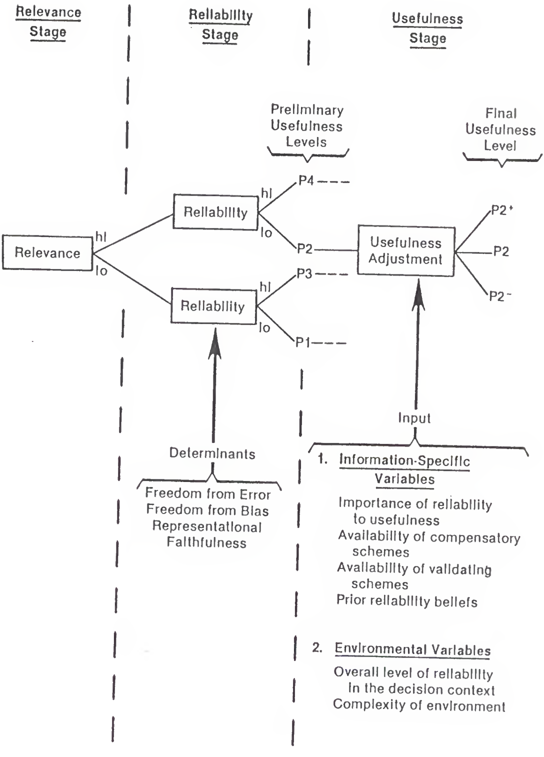
Relevance Stage
Reliability Stage
Usefulness Stage
Preliminary Usefulness Levels
Final Usefulness Level
Relevance
hi
lo
Reliability
hi
lo
P4
P2
Reliability
hi
lo
P3
P1
Usefulness Adjustment
P2+
P2
P2-
Determinants
Freedom from Error
Freedom from Bias
Representational Faithfulness
Input
1. Information-Specific Variables
Importance of reliability to usefulness
Availability of compensatory schemes
Availability of validating schemes
Prior reliability beliefs
2. Environmental Variables
Overall level of reliability in the decision context
Complexity of environment

Figure 2: Relevance & Reliability Decision Tree

2. Availability of compensatory schemes--is the user able to compensate for deficiencies in reliability through the use of other measures?
3. Availability of validating schemes--is the user able to validate the reliability of the information even though the information appears deficient in reliability?
4. Prior reliability beliefs--does the user expect this type of information to be reliable, a priori?

Two environmental variables, which vary according to the decision environment, could influence the user's final usefulness level:

1. Overall reliability level in the decision context--to what extent does the user require a higher level of reliability for a given disclosure when the overall reliability of the decision context is high?
2. Complexity of environment--to what extent does the user require a higher level of reliability if the decision environment is complex?

The user's choice of a final usefulness level will be determined by these variables, and is represented in Figure 2 as $P2^+$, P2, and $P2^-$, indicating that the influence of the variables can be positive, negative, or neutral with respect to the preliminary usefulness level. For example, a user might receive a disclosure that is high in relevance but low in reliability. In this instance, the user believes that reliability is more important in order for this type of information to be useful. Additionally, the decision environment might be characterized by a high overall level of reliable information which leads the user to desire higher reliability. As a result of considering both of these factors, the user might assign a low final usefulness level ($P2^-$).

In this study, one variable from each of the two groups is examined. From the information-specific variables, I look at the availability of validating schemes to see if the type of information reported offers the user a way of concluding that the reported information is more reliable than it originally appeared. From the environmental variables, I examine the overall level of reliability in the decision context and investigate whether the user reacts differently to the information's low reliability level depending on whether the information environment is characterized by a large amount of reliable information or a small amount of reliable information. These two variables were chosen because they offered an opportunity to examine user reaction to low reliability information in ways that appear to be uniquely important to financial reporting structures. This research examined these two variables in a laboratory experiment involving fifty bank credit analysts.

The remainder of this study is organized as follows: In Chapter II, previous research related to the reliability and usefulness stages of Figure 2 is reviewed. The research hypotheses are also developed in that chapter. Chapter III describes the experiment used in this study to examine the research problem. Chapter IV presents a discussion of the results of the experiment, and Chapter V contains the conclusions and implications of the study, a discussion of its limitations, and suggestions for further research in the area.

CHAPTER II
RELATED RESEARCH AND HYPOTHESIS DEVELOPMENT

In this chapter, I will examine a framework of financial reporting and look at two of the key variables that are assumed to affect the user's implicit assignment of usefulness levels to high relevance, low reliability disclosures. The discussion will draw on research results from accounting, information economics, and psychology. In the course of the discussion, research hypotheses for the study will be developed.

Chapter II is organized around Figure 2 (page 11). The relevance stage of Figure 2 has been dealt with extensively in the literature[1] and is not at issue in this research. The reliability stage of Figure 2 is explored in the first section through a discussion of the information producer (manager) and his impact on the reliability of financial accounting information. It is shown that there exist incentives, within a context of the principal-agent relationship and stewardship reporting, for the information producer to bias the reported information and thereby affect its reliability. A mechanical way of expanding and contracting the ability of the information producer to effect this bias will be discussed.

---

[1] See, for example, studies in the economics of financial information by Feltham [1968] and Butterworth [1972].

In the following section, the usefulness stage of Figure 2 is considered. Here, I analyze (1) how the information receiver (user) is likely to react to information that is potentially biased, and hence low in reliability; (2) how he can employ a validating scheme to overcome the suspicion of bias; and (3) how the overall reliability level in the decision context can affect the evaluation and use of the biased information. The research hypotheses are developed in this section.

The next section contains a discussion of previous research studies in accounting which have examined relevance and reliability. This is followed by a section that summarizes the previous discussions.

The Reliability Stage and the Information Producer

Under the FASB's definition, reliability is made up of three component elements: freedom from error, freedom from bias, and representational faithfulness. These elements are not independent, however. Error and bias represent, respectively, unintentional and intentional misstatements of the underlying attribute being measured. As such, error and bias distort the representational faithfulness[2] of the measurements.

---

[2] Representational faithfulness is the "correspondence or agreement between a measure or description and the phenomenon that it purports to represent" (SFAC No. 2, p. xvi).

In SFAC No. 2, bias is defined as follows:

> Bias in measurement is the tendency of a measure to fall more often on one side than the other of what it represents instead of being equally likely to fall on either side. Bias in accounting measures means a tendency to be consistently too high or too low. [p. xv]

Bias can be either the result of the _measurement_ (i.e., a faulty measure) or the _measurer_. In keeping with contemporary accounting literature's emphasis on the incentives of the information producer, measurer bias is strategically manipulated in the research design as a way of controlling for reliability.

In this study, agency theory and stewardship reporting will serve as the basis for examining the incentives for the producer of financial accounting information (the manager) to introduce measurer bias and thus unreliability into the disclosures. The subsequent discussion will examine the implications for the reporting system of these incentives for bias.

Agency Theory and Stewardship Reporting

The agency theory literature of the last decade[3] has provided an unusually rich analytic framework for discussion of financial accounting issues. In its broadest form, the agency relationship can be represented as a "nexus (or network) of contracts." The process starts when a principal chooses to delegate the authority to operate an enterprise to an agent. The extent of each of the parties' responsibilities in this arrangement is established in a contractual agreement. The terms of the contract can be expected to provide the necessary incentives to induce agent behavior consistent with the preferences of the principal. In other words, the principal wants to motivate the agent to manage the enterprise the way the principal would manage it himself. The principal hopes to accomplish this by contract.

---

[3] For example, Ross [1973], Jensen and Meckling [1976], and Fellingham and Newman [1979].

Monitoring costs will be incurred by the principal to ensure that the agent is carrying out his duties faithfully. On the other hand, it may be in the agent's best interest to incur bonding costs to reassure the principal as to his (the agent's) proper conduct, including the avoidance of shirking and excess perquisite consumption.

The agent is usually the producer of the information required by the principal in assessing the agent's performance. This results because the agent has ready access to the information and it is usually more efficient (less costly) for him to supply the information to the principal than for the principal to uncover it for himself. In the contract, the principal will specify the nature of the information system to be maintained by the agent.

The concept of stewardship is very closely associated with the principal-agent relationship. Note the parallels: a steward is usually defined as a person who has custody of another person's property and an important responsibility of the steward is to make an accounting of his stewardship. If corporate managers are viewed as the stewards of property belonging to the company's shareholders, financial statements emerge as reports on the manager's discharge of his stewardship responsibilities.[4] This view of "accountability" has long been recognized as an integral part of the reporting practices necessitated by the separation of ownership and management (i.e., the existence of a principal-agent relationship) [Paton and Littleton, 1940]. In fact, stewardship reporting has been cited regularly as a basic objective of financial accounting over the last fifty years [May, 1943; Wixon, Kell, and Bedford, 1970].

Contemporary accounting literature has also focused on the use of accounting information by investors as an input into their own consumption/investment functions. This use may be characterized as the decision-making demand for information and has been widely developed in the literature.[5] The stewardship demand for financial information, on the other hand, arises from the owner's delegation of authority to managers and the desire to be kept informed of the manager's decisions for control purposes [Gjesdal, 1981].

---

[4] In SFAC No. 1, the FASB states, "Financial reporting should provide information about how management of an enterprise has discharged its stewardship responsibility to owners (stockholders) for the use of resources entrusted to it" [FASB, 1978, para. 50]. But the FASB goes on to warn that financial reporting cannot separate management performance from enterprise performance.

Agency theory provides a formal economic explanation for the existence of a stewardship demand for information. The provision in the agent's contract specifying an information system serves the dual purpose of providing incentives for the manager (agent) to take actions which are congruent with the owner's (principal's) preferences and, concurrently, serving as a monitor of the manager's actions.[6] Each party is willing to contract for such an information system because it offers benefits in excess of its costs. The principal feels that the increased output of the work-averse agent will more than offset the direct cost of the system, such cost being ultimately borne by the principal [Jensen and Meckling, 1976]. The agent recognizes that in the absence of the information system provision in the contract, the principal will assume a higher level of shirking and excess perquisite consumption than the agent would actually engage in, and accordingly, will adjust the agent's salary downward. As long as the cost-benefit relation is favorable, there will be a stewardship demand for information,[7] regardless of regulatory intervention. This result is consistent with Watts [1977].

---

[5] See, for example, Hirshleifer [1971], Marshall [1974], and Gonedes [1975].

[6] These two functions are not contradictory. The system itself serves as a monitoring device while incentives tied to the system's output provide for the congruence of objectives.

There is no reason to believe that in the absence of regulation, financial statements generated by the stewardship demand for information would be identical to statements generated by decision-making demand. Under the present regulated system, financial statements in effect serve both purposes simultaneously. Therefore, one should expect the influences of stewardship reporting to pervade financial reporting even if the statements are used for decision-making purposes.

Limiting Producer Bias

It has been established so far that the contract between the manager (agent) and the owner (principal) will call for an information system to be maintained by the manager. The owner desires that this reporting system act as a monitor of the manager's actions and, at the same time, encourage the manager to make decisions consistent with the owner's preferences. The next step is to consider the implications of the manager's control over the reporting system. The information inductance hypothesis serves as a basis for this discussion.

---

[7] If the principal believes that the labor market for managers is efficient and that this will provide the incentive for the manager to avoid shirking or excess perquisite consumption [Fama, 1980], the stewardship demand for information may be reduced since the control aspects of the system become less important. There still may be an incentive for managers to bear the informational cost themselves as a type of bonding cost. In this instance, the voluntary act of providing assurance in the form of stewardship information is a signal to the owners that management is not shirking or consuming excess perquisites.

In essence, the information inductance hypothesis asserts that if information asymmetry between owner and manager exists, managers are induced to take actions in their own self interest that influence financial accounting reports [Prakash and Rappaport, 1977]. In other words, if the manager believes that the message transmitted in the form of financial statements might affect the evaluation of his performance, he may be induced to enhance the accounting measurements.

The induced effect on the accounting reports can be of two basic types:

1. The manager actually modifies his performance.
2. The manager alters the reporting of his performance.

The second type of induced effect represents measurer bias and as such affects the reliability of the reported information.

Assume that the manager's incentive compensation is tied to reported net income. On the basis of the information inductance hypothesis[8] and the nature of the manager's reward scheme, it seems reasonable to conclude that there will exist an incentive for the manager to take whatever discretionary action is available to him to bias net income upward. The strength of the inducement will vary, of course, with the manager's assessment of the likelihood of some form of ex post settling up, such as disciplining by an efficient labor market for managers [Fama, 1980]. Additional constraints on the manager's reporting discretion may be requirements that the statements conform to "generally accepted accounting principles" (GAAP) and that they be audited.

---

[8] Although the information inductance hypothesis has not been empirically validated to date, it has gained widespread acceptance in the literature. Recent empirical studies have examined the information

The information system contained in the contract between the principal and the agent can require measurements that are constructed in such a way that the agent has little power to bias the measurement either up or down. This is accomplished by making the measurements as "hard" as possible.[9] According to Ijiri [1975],

> The lack of room for disputes over a measure may be expressed as the hardness of the measure. A "hard" measure is one constructed in such a way that it is difficult for people to disagree. A "soft" measure is one that can easily be pushed in one direction or the other. [p. 36]

---

inductance hypothesis within contexts of transfer pricing [Gomaa, 1982] and foreign currency translation [Wilner, 1982].

[9] It has been commonplace in the literature to represent the objectivity of a set of measurements as the variance, sigma-squared, of the measurements. A parallel representation for hardness can be expressed as

Sigma-squared + Bias Factor

[Ijiri and Jaedicke, 1966, and Ijiri, 1975].

An example of hardness can be found in the difference between historical cost and current cost accounting. Historical cost is considered an inherently hard measure because there are only a very limited number of ways of measuring it, i.e., there is a restricted set of measurement rules and the measurement rules are disclosed. Current cost, on the other hand, is not considered a hard measure. Even though the measurement rules may be fully disclosed, they cannot be practically restricted enough to limit the manager's power to bias the information.[10]

Referring back to the income-based incentive scheme described above, Gjesdal [1981] observes that such a situation implies that "hardness is a necessary characteristic of stewardship information" [p. 218]. This result is founded on the presumption that the manager will "always report the message which gives him (her) the highest reward. It follows that (without hardness) his (her) report is uninformative and without value" [p. 218]. Varying hardness is a mechanical way of altering a manager's ability to bias reported information. The experimental design used in this study strategically manipulates hardness as a way of controlling for measurer bias and therefore, the information's reliability.

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[10] For instance, suppose the measurement rule states: "Estimates of current costs will be made by a licensed appraiser using professionally recognized techniques." The manager could solicit three appraisals and disclose the highest if he desires a high value and the lowest if he desires a low value. There is empirical support for this assumption of variability in appraisals. For instance, a study conducted by Dittrich [1966] showed variability in the appraisals of 53 parcels of real property equal to 57 percent of the overall mean value.

The Usefulness Stage

In the last section, it was shown that there are incentives for the manager to bias reported financial information within the constraints imposed by the hardness of the contractual information system. In this section, the focus of the discussion will be shifted to the usefulness stage of Figure 2. I will discuss two key variables that are assumed to have a significant impact on the user's assignment of a final usefulness level to a high relevance, low reliability disclosure. These variables are 1) the availability of validating schemes (an information-specific variable), and 2) the overall level of reliability in the decision context (an environmental variable).

The Availability of Validating Schemes

A user of financial information may have access to an accounting disclosure that is high in relevance but relatively low in reliability. It seems reasonable to assume that the user will approach such information with skepticism because of its low reliability. Rather than discard the information completely, the user may try to "test" or "validate" it in an attempt to determine if it is more reliable than it originally appeared, and if so, assign a higher final usefulness level (e.g., $P2^+$) to it. For example, the user could choose to have the information audited, but this type of validation is costly. If the user has limited resources, he may try to achieve the validation within the confines of the disclosure and his own prior beliefs and experience. I will refer to this process as a validating scheme.

The validating scheme is a mental process of searching the new disclosure and existing disclosures for evidence that the new disclosure's reliability level is higher than was initially believed and hence, more useful. Two preliminary observations can be made about validating schemes: (1) not all disclosures can be expected to permit a user to employ a validating scheme; and (2) the validating scheme, when it is available, will be a product of the new disclosure, existing disclosures, and the mental processes employed by the user. The latter observation implies that it is difficult to generalize about the way a user will develop a validating scheme. Even so, it seems useful to think about a possible scenario of the way a validating scheme might be invoked. The concept of decision heuristics provides a likely basis for this discussion.

A heuristic[11] is a "cognitive simplification method" used to cope with an environment that is complex and characterized by uncertain relationships [Hogarth, 1981]. According to Tversky and Kahneman [1974, p. 1124], "People rely on a limited number of heuristic principles which reduce the complex tasks of assessing probabilities and predicting values to simpler judgmental operations." For example, one important type of heuristic that people have been found to use is "representativeness." It can be described as follows:

The probability that event A originated from process B can be evaluated by the degree that A is representative of B. "For example, when A is highly representative of B, the probability that A originates from B is judged to be high. On the other hand, if A is not similar to B, the probability that A originates from B is judged to be low" [Tversky and Kahneman, 1974, p. 1124].

As an example of a validating scheme based partly on the representativeness heuristic, suppose a user is presented with financial information that is high in relevance and low in reliability, such as an appraisal of land commissioned by management. The user suspects that management may have "shopped" for a high appraisal. However, if the user knows something about land values in the vicinity of the land in question, then the extent of the similarity of the appraisal to known land values may determine the user's probability that the appraised value is reliable. In other words, the appraisal may be judged by its representativeness in the mind of the information user. In the terminology of the heuristics literature, when the appraisal is representative of known land values, the probability that the appraisal originates from the set of actual land values is judged to be high. However, if the appraisal is not similar to known land values, the probability that the appraisal originates from the set of actual land values is judged to be low.

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[11] Recent studies have looked at the use of heuristics in accounting and auditing settings. Examples are Joyce and Biddle [1981a; 1981b], and Magee and Dickhaut [1978].

In addition to representativeness, two other heuristics are often cited and could be employed in a user's validating scheme: "availability" and "adjustment from an anchor." Availability describes "situations in which people assess the frequency of a class or the probability of an event by the ease with which instances or occurrences can be brought to mind" [Tversky and Kahneman, 1974, p. 1127]. People use adjustment from an anchor when estimates are made "by starting from an initial value that is adjusted to yield the final answer. The initial value, or starting point, may be suggested by the formulation of the problem, or it may be the result of a partial computation" [Tversky and Kahneman, 1974, p. 1128]. The type of heuristic employed by the user (representativeness, availability, anchoring, or some other) will be a function of the information disclosed and the user's mental process in devising a way to validate the information's reliability.[12]

In this research, I attempt to demonstrate that reliability validating schemes can exist and will lead to higher levels of usefulness. In addition, I intend to show that heuristics can play a part in the validation scheme, and if possible, identify which heuristics are at work.

Overall Level of Reliability in the Decision Context

I expect the overall level of reliability in the decision context to affect the user's assignment of a final usefulness level to a new high relevance, low reliability disclosure. I use the term "decision context" to mean the environment surrounding the immediate decision. In the subsequent discussions, two overall reliability levels, low and high, are analyzed and predictions are made of their specific effect on the new disclosure's marginal usefulness.

Low. I have specified the type of reliability impairment in the decision context for this study to be the potential for information producer bias. When the overall reliability level in the decision context is low, it is unlikely that the reliability levels of other sources of information will have an impact on the user's assessment of the final usefulness level of the new disclosure. The disclosure will tend to be evaluated on its own merits rather than on the way it compares to other disclosures in terms of reliability. In the case of a low overall reliability level in the decision context, the problem is one of how the user will react to biased information. An area in the psychology literature known as "source credibility" provides a basis for my expectations.

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[12] Much of the heuristics literature has focused on the systematic bias that can be introduced into the decision-making process through the use of heuristics. This bias can lead to suboptimal decisions if the negative effect of the bias is greater than the user's cost saving from employing such a heuristic. Although the possibility of deviations from an optimal model is important in its own right, it is not considered in this study.

Hovland, Janis, and Kelley [1953] summarized the source credibility problem as follows:

> A recipient (of information) may believe that a communicator is capable of transmitting valid statements, but still be inclined to reject the communication if he suspects the communicator is motivated to make nonvalid assertions. It seems necessary, therefore, to make a distinction between 1) the extent to which a communicator is perceived to be a source of valid assertions (his "expertness") and 2) the degree of confidence in the communicator's intent to communicate the assertions he considers most valid (his "trustworthiness"). In any given case, the weight given a communicator's assertions by his audience will depend upon both of these factors, and this resultant value can be referred to as the "credibility" of the communicator. [p. 21]

A study by Kelman and Hovland [1953], gauging the effect of a radio speech advocating leniency for juvenile delinquents, showed the "trustworthiness" effect to have a stronger positive impact on belief changes than the "expertness" effect. Although unbiased and biased sources were both associated with positive belief changes, the effect was significantly stronger for unbiased sources.

Hovland and Mandell [1952] tested the effect on the beliefs of college students by a discussion of the American monetary system and a conclusion advocating a devaluation of the dollar. The results were inconclusive with both the unbiased and biased speakers generating a statistically insignificant change in beliefs.

An experiment by Rosenbaum and Levin [1968], characterizing source credibility by the source's occupation, indicated an assignment of more weight to information supplied by a high credibility source than by a low credibility source. A study by Birnbaum and Stegner [1979] asked subjects to estimate the value of a hypothetical used car using, in part, estimates given by sources who varied in expertise and bias. Subjects were asked to identify with either the buyer or the seller, or remain neutral, to allow the experimental manipulation of the subject's point of view. Results were consistent with significant effects for source bias and expertise, and subjects' point of view. In addition, the interaction of bias and expertise was significant, implying that the bias introduced by a source of greater expertise is greater than the bias introduced by a source of less expertise.

The overall tenor of the source credibility research is that, holding expertness constant, the information receiver can be positively influenced by a biased information source, but significantly less so than by an unbiased source. For this study, it means that the information producer's biased information will have a positive impact on the user's decision but the impact is less than if the information producer had been unbiased. In terms of our discussion,[13] let P2-L be the final usefulness level of the disclosure in a low reliability environment. Then, $MU(P4|P3) > MU(P2\text{-}L|P3)$ and $MU(P2\text{-}L|P3) > 0$.

High. Next, suppose that the overall level of reliability in the decision context is high. I hypothesize that the user will evaluate the new disclosure at least partially on how its reliability level compares to the overall reliability level. Kahneman and Tversky [1979] and Tversky and Kahneman [1981] demonstrate that decision makers facing uncertainty (1) exhibit behavior inconsistent with expected utility theory by underweighting probable outcomes in comparison with outcomes that are certain, and (2) are strongly influenced by the way a decision is "framed." Kahneman and Tversky [1979] offer the following task and its outcome as an illustration of (1).

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[13] P4 is high relevance, high reliability; P3 is low relevance, high reliability; and P2 is high relevance, low reliability.

Respondents were offered the following choices with the corresponding outcomes and probabilities:

Alternative A: $4,000 with an 80% probability

or

Alternative B: $3,000 with a 100% probability

In this situation, eighty percent of the respondents chose B. In another case, the choices were

Alternative C: $4,000 with a 20% probability

or

Alternative D: $3,000 with a 25% probability

In this instance, sixty-five percent of the respondents chose C.

It is apparent that these results violate the substitution axiom of utility theory, which states, "If B is preferred to A, then any (probability) mixture (B,p) must be preferred to the mixture (A,p)"[14] [p. 266]. Alternative C is actually (A,.25) and D is (B,.25). If subjects chose B over A, then by the substitution axiom, they should have chosen D over C. The results imply that "reducing the probability of winning from 1.0 to .25 has a greater effect than the reduction from .8 to .2" [pp. 266-7]. Kahneman and Tversky offer prospect theory as an explanation for this "certainty effect" and other anomolous effects.

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[14] (A,p) is a probability of p applied to alternative A. If p = 0.5, then (A,p) is $4,000 with a (0.8 x 0.5) or 0.4 probability.

In prospect theory, as contrasted to utility theory, "value is assigned to gains and losses, rather than to final assets and . . . probabilities are replaced by decision weights" [p. 263]. In addition, under prospect theory, the choice decision is viewed as two separate actions: the editing phase, when the options are simplified by organization and reformulation, and the evaluation phase, when values are assigned to the edited prospects. One function of the editing phase is to separate the choices into their riskless and risky components before evaluation. Then when the evaluation takes place, the decision weights favor the riskless components over the risky components in the overall process, leading to the observed "certainty effect."

Tversky and Kahneman [1981] extend the discussion by focusing on the editing phase of the decision, which they rename "framing." They use the term "decision frame" to refer to

> the decision-maker's conception of the acts, outcomes, and contingencies associated with a particular choice. The frame that a decision-maker adopts is controlled partly by the formulation of the problem and partly by the norms, habits, and personal characteristics of the decision maker. [p. 453]

If the overall reliability level in the decision context is high, I propose that the additional high relevance, low reliability disclosure will be discounted in the user's "editing phase" of assessing the disclosure, as the risky components of the decision are assigned lower decision weights as suggested by prospect theory. For example, the new disclosure's unreliability is recognized by the user. The user then "sorts" that information into the low usefulness compartment. When the evaluation of the decision happens, the user places less emphasis on the contents of the low usefulness compartment which includes the new disclosure.

To contrast this outcome with the situation when the overall reliability level of the decision context was low, I view the shift of reliability level from low to high as causing a shift in the decision frame to focus more on reliability as a criterion for usefulness. Letting P2-H be the final usefulness level of the new disclosure in a high reliability environment, it follows that $MU(P2\text{-}L|P3) > MU(P2\text{-}H|P3)$ where P2-L is the final usefulness level of the new disclosure in a low reliability environment, as described previously.

Research Hypotheses

The research hypotheses for this study are based on the foregoing discussions. Hypothesis A, below, is concerned with the use of validating schemes. The decision context hypotheses are subsumed under the general heading of "B" and are identified as B-1, B-2, and B-3.

Hypothesis A

> Financial statement users will cognitively employ available validating schemes to test the reliability of the disclosures.

A validating scheme is a cost efficient way of permitting the user to test the reliability of seemingly unreliable information. If validation is possible, the user will assign a higher final usefulness level to the disclosure.

In applying a validating scheme, it is likely that the user will rely on heuristics, at least in part. This secondary assertion is tested in the experiment along with the main hypothesis. In addition, I attempt to identify which heuristic, if any, is used.

Hypothesis B-1

> The marginal usefulness of a high relevance, low reliability disclosure is affected by the overall reliability level in the decision context; the marginal usefulness is greater when the overall reliability level is low than when it is high. Symbolically,

$$MU(P2\text{-}L|P3) > MU(P2\text{-}H|P3)$$

A high overall reliability level shifts the frame of the user's editing phase to focus on reliability. In this case, the low reliability disclosure is sorted into the low usefulness compartment and so receives less emphasis in the decision evaluation stage, leading to lower marginal usefulness.

Hypothesis B-2

> When the overall reliability level in the decision context is low, the marginal usefulness of a high relevance, low reliability disclosure is greater than zero.

$$MU(P2\text{-}L|P3) > 0$$

The source credibility literature asserts that even low credibility sources can be expected to influence the receiver (i.e., user) positively. Hence, the marginal usefulness of the disclosure is strictly positive.[15] This result is anticipated to hold as long as the overall reliability level of the decision context is low. If the reliability level is high, the framing effect of hypothesis B-1 may overwhelm the influence of the low credibility source. This last statement implies that

$$MU(P2\text{-}H|P3) \geq 0$$

That is, one cannot determine whether the P2-H disclosure will have any effect.

Hypothesis B-3

> When the overall reliability level in the decision context is low and validating schemes are not present, the marginal usefulness of a high relevance, low reliability disclosure is less than a high relevance, high reliability disclosure.

$$MU(P4|P3) > MU(P2\text{-}L|P3)$$

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[15] This is not equivalent to stating "More information is preferred to less." Ignoring cost, users will always desire more information but the additional information may or may not have a decision impact.

The source credibility literature also asserts that a low credibility source will not have as strong an impact on the user-receiver as a high credibility (P4) source. This is true as long as the framing effect and validating schemes are not present. (If validating schemes are present, P2-L may be equal to P4.)

Hypotheses B-1, B-2, and B-3 may be summarized as follows:

$$MU(P4|P3) > MU(P2\text{-}L|P3) > MU(P2\text{-}H|P3) \geq 0$$

The research hypotheses are translated into operational hypotheses in Chapter III.

Previous Research in Relevance and Reliability

Stanga [1980] and McCaslin [1982] are the only two previous empirical studies concerned specifically with relevance and reliability.[16] Stanga [1980] surveyed bankers and financial analysts concerning their assessments of the relevance and reliability of thirty items of financial accounting information such as historical cost of inventories, replacement cost of inventories, and segment data. For relevance, respondents rated the information items on a scale of 1, very relevant, to 5, very irrelevant. They rated reliability on a corresponding scale. Bankers were instructed to evaluate each information item in a framework of extending a moderate size term loan to a publicly held industrial company. Analysts' evaluations were in the context of making a decision to buy, sell, or hold a small number of common shares in a publicly held industrial company.

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[16] Examples of research investigating other qualitative characteristics of information are:Green, Robinson, and Fitzroy [1967], Snapper and Peterson [1971], and Hilton, Swieringa, and Hoskin [1981]. Joyce, Libby, and Sunder [1982] gauged the ability of accounting policy makers to assign operational measures of SFAC No. 2's qualitative characteristics, including relevance and reliability, to competing accounting disclosures.

Stanga's findings are consistent with a positive relationship between relevance and reliability: the higher the reliability, the higher the relevance. However, this seems to result from his method of data analysis. Stanga calculated correlation coefficients between subjects rather than between rival accounting methods. His results imply that subjects who rank historical cost high in reliability also rank it high in relevance. However, the important question is whether subjects rank current cost higher in relevance than historical cost but lower in reliability. I have assumed in this study that relevance and reliability have an inverse relationship between rival accounting methods and this latter view is supported by FASB [1980]. A cursory look at Stanga's data also seems to confirm this (for example, the questionnaire results (mean response) for analysts in the case of merchandise inventories, presented below [Stanga, 1980, p. 34]).

	Relevance	Reliability
Replacement cost	1.990	2.470
Historical cost	2.287	1.670

Note that replacement cost is rated stronger in relevance but weaker in reliability than historical cost.[17]

McCaslin [1982] sent questionnaires to samples of bankers, analysts, and chief financial officers. The subjects were requested to rate a total of thirty financial statement items on seven-point scales of relevance and reliability. Eleven of the financial statement items were measured on a historical cost basis, eleven on a constant dollar basis, and eight on a current cost basis. The financial statement items for constant dollar and current cost were those required under FASB Statement No. 33.

McCaslin's results were consistent with the assertion that all three subject groups rated constant dollar and current cost items lower than historical cost items in both reliability and relevance. This implies a direct rather than inverse relationship between relevance and reliability. But McCaslin admits that the subjects seemed to be so concerned about the perceived low reliability of the constant dollar and current cost information that they assumed the information could not be relevant to their decisions. This interpretation, however, implies that the subjects confused relevance and usefulness. Relevance represents the capacity of information to change a decision while usefulness is a product of both relevance and reliability. Users should assess relevance and reliability independently of each other. Low reliability should affect the usefulness of the information _not its potential relevance_.

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[17] As a practical matter, it is unrealistic to assume that relevance and reliability could have a positive relationship. If they did, standard-setters could improve the relevance of disclosures merely by improving their reliability.

This study is considered an improvement over these previous research studies because it requires accounting information users to make decisions from accounting information while the levels of relevance and reliability are experimentally manipulated. The research design attempts to control for relevance and reliability separately in determining their respective effects on usefulness.

Summary

Chapter II began by analyzing the relationship between the financial information producer (manager-agent) and owner-principal, and recognizing that within the financial reporting framework, information producer bias can influence the reported information, but that the degree of influence can be controlled by the degree of hardness inherent in the system. From the standpoint of the user, Chapter II explored two variables that are likely to influence the impact on a user's decision by the introduction of information that is high in relevance but low in reliability. The effect of validating schemes to test the disclosure's reliability was examined by reference to the potential application of heuristics by the user. The effect of the overall reliability level in the decision context was explored by reference to prospect and framing theories, and source credibility. Specific research hypotheses enumerating the effect of these variables on the marginal usefulness of the disclosure were developed. In addition, a description of previous research in relevance and reliability was presented.

CHAPTER III
METHODOLOGY

The research hypotheses were investigated empirically through an experiment administered to commercial bank credit analysts. The task involved assessing the credit worthiness of a series of hypothetical firms. This chapter contains descriptions of the subjects used, the pilot tests, the main experiment, and the methods of data analysis.

Subjects

Subjects were members of the credit analysis departments of four major commercial banks in Florida. "Credit Analyst" is an entry-level position in the commercial lending department of a bank and can lead to a position as a bank loan officer. Credit analysts spend much of their time reviewing financial statements supporting loan applications. Credit analysts seemed to be appropriate subjects for this study because their primary contact with loan applicants is through financial information supplied to them rather than the personal contact that other bank employees have. Eight analysts participated in the pilot tests, and 50 analysts provided usable responses for the final experiment.[1] Due to the constraint of subject availability, the subjects did not constitute a random sample of all commercial bank credit analysts. The average age of the subjects in the final experiment was 24.8. All final-experiment subjects possessed bachelor's degrees while 4 of 50 subjects held a master's degree and 6 others had completed some graduate work. The level of experience of the subjects ranged from one month to 3 years with a mean level of 7.6 months.

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[1] One analyst's response was incomplete and therefore, not usable.

Pilot Tests

Three pilot tests of the entire experiment were administered in Fall 1983 to banks with small credit analysis departments (to conserve subjects for the final experiment). I wanted the pilot tests to point out any deficiencies in the construction of the experimental instrument or erroneous assumptions that I might have made about the reactions of the analysts to the information presented. The following major changes in the instrument were made after the first pilot test:

1. Based on conversations with a former senior analyst, I originally assumed that credit analysts would view appraisals commissioned by management as soft information. As it turned out, credit analysts appear to view appraisals as relatively hard information since third parties are involved. I changed the appraisals in the experiment to estimates of market value given by management.

2. I had avoided including "secured" loans in the experiment because of subject expectations of the type of information that is normally provided for these loans (such as appraisals). To include loans of this type would have limited my ability to give the subjects "additional information" to gauge the marginal effect on credit ratings: the subjects would have expected this information from the beginning. Consequently, all loans in the experiment were unsecured. Discussions with the subjects following Pilot Test 1 disclosed that they were resistant to considering asset market values for unsecured loans. The subjects were looking to the prospect of future operating cash flows to service these loans, not the liquidation of assets. As a result, the experimental tasks that dealt with the market value of intangibles were changed to define value in terms of a stream of future payments combined with a lump-sum initial payment.
3. I had originally included two essentially identical companies except that one company owned vacant land and the other owned a 100 percent interest in another business. I gave the subjects market values for both assets, expecting the subjects to "validate" the value of the land by comparing the value to the land's original cost, which they seemed to do. I

also expected the subjects not to attempt a validation of the value of the ownership interest because I assumed that the relationship between the cost of a business investment and its market value could not be linked. The results, however, revealed that some subjects did try to validate the business' value as they had for the land's value. I changed the second task to include another parcel of land which was acquired later than the first parcel.

Other major changes resulted from Pilot Tests 2 and 3 as follows:

1. Subjects were asked to evaluate the "dependability (reliability)" of some of the information given to them. This was included to add depth to the analysis and to uncover subject perceptions not evident solely from the credit rating changes.
2. The land parcels discussed previously were included in a "negative pledge" for the unsecured loans; that is, the company agreed not to further encumber the land while the loan was outstanding.
3. I randomized the order of two sets of paired tasks to control for possible order effects.

Other changes resulting from the pilot tests were the refinement of the "Additional Questions" section and other specific wording and numerical size refinements in the instrument.

Procedure

The experiment was administered in person to groups of credit analysts either in a bank conference room, if available, or at the subjects' desks. Subjects were given a packet containing 5 tasks, a cover page of general information, and a section containing "additional questions." (The experimental instrument is reproduced in the Appendix.) After distributing the materials, I introduced myself, emphasized the bank's participation, read aloud the "General Information" page, and solicited questions. I had previously requested that the departmental supervisor have the subjects bring calculators with them in case they wished to use them.

Each task required the subject to assign a credit rating to hypothetical firms described in the task write-up. The credit rating system was explained to the subjects as follows:

> Assume that your bank has established a system of assigning credit ratings to firms requesting loans. When a loan application is received, a review of the information available in comparison to the size and type of the loan requested is made. A credit rating is assigned that reflects your assessment of the risk that the loan will become a <u>problem loan</u> at some time during its term. The credit rating will be a number from 1 to 10 using the scale below as a guide:

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     |---|----|---|---|---|---|---|----|---|
     1   2    3   4   5   6   7   8    9   10
very risky:      moderately risky:    almost risk free:
will probably    some chance of       practically no
become a         becoming a           chance of becoming
problem loan.    problem loan.        a problem loan.
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Experimental Tasks

Differences in the credit ratings provided by the subjects were used as surrogates for the marginal usefulness of the financial disclosures manipulated in the experiment.

Hypothesis A

The first two of the five tasks were concerned with Hypothesis A (the use of a validating scheme and heuristics). In Task 1, the subjects were asked to assign a credit rating under two conditions to a firm that owns a parcel of vacant land. Although the land would not be collateral for the loan, it would be subject to a "negative pledge": that is, the company could not further encumber the land while the loan was outstanding. First, the land was shown on the firm's balance sheet at historical cost only. Subjects assigned a credit rating to the firm (CR1-1). Next, the subjects were given management's estimate of the land's market value, the date of acquisition, 1973, and a short description of the land's location. Subjects were asked to assign a second credit rating given this additional information (CR1-2).

Management's estimate of the land value is assumed to be soft information and hence, subject to information producer bias. CR1-2 less CR1-1 is a proxy for $MU(P2|P3)$, where P2 is the high relevance, low reliability disclosure (estimate of land value) and P3, the low relevance, high reliability disclosure (historical cost). Management's estimate of the land value was constructed by adjusting the historical cost of the land by the approximate inflation rate between 1973 and 1983 (120%). The subjects could have applied a validating scheme in Task 1 by extrapolating the historical cost of the land using estimates of inflation to test the value estimate. Subjects who employed such a validating scheme should have been associated with higher values of MU(P2|P3). Task 1 will be referred to as the "high validating" (HV) scenario.

Task 2 described a virtually identical firm: the financial statement amounts were the Task 1 amounts multiplied by a constant and the description of the firm was similar to the description of the Task 1 firm. Subjects assigned a credit rating to the firm (CR2-1). As in Task 1, another credit rating was assigned (CR2-2) after disclosure of management's estimate of the land value, the date of acquisition, and a description of the land's location. The difference between the two tasks was that the acquisition date in Task 2 was 1981 instead of 1973, but the estimated value of the land still reflected an appreciation of 120% during the holding period. Again, the difference in credit ratings (CR2-2 less CR2-1) was a proxy for MU(P2|P3) except that in Task 2 the subjects should have been less willing to accept the land value estimate as "validated" and so, less willing to assign a higher credit rating. Task 2 will be referred to as the "low validating" (LV) scenario.

Following the assignment of credit ratings in both Task 1 and Task 2, each subject was asked to rate the "dependability (reliability)" of the additional information (i.e., estimate of land value) in the task on a scale of 1 to 7; with 1 representing "very undependable" and 7, "very dependable." This rating is referred to in the study as the reliability index. It was included to provide another measure of the subjects' reactions to the level of reliability of the additional information in the HV and LV scenarios.

Also following the assignment of credit ratings in both Tasks 1 and 2, each subject was asked to respond to the following questions:

> (1) Please write a short explanation of how you used the additional information (land value) on page 2 in reassessing the credit rating of the firm.
>
> (2) Did management's estimate of the land value seem reasonable to you in light of the available facts? Did you feel that you could depend on it? Why or why not?

These questions were included to (1) confirm that the subjects did, in fact, use the additional information in the revision of the credit rating; (2) to confirm that subjects used a validating scheme; and (3) if so, determine whether it was based on an identifiable heuristic.

Question 4 in the "Additional Questions" section of the instrument asked the subjects if they had considered the "reasonableness" of the additional information in Task 1 for one-half of the subjects, or Task 2 for the other half. If the subjects had considered the additional information's reasonableness, they were asked to check off which factors on a list of possible factors influenced their assessment of the reasonableness of the additional information. There were blank spaces for subjects to record any factors they used that were not in the list. Subjects were also requested to rank-order the factors they chose, starting with a rank of 1 for the most important factor. One of the possible factors in the list was "comparison of 'land value' with original cost of land." This factor describes the validating scheme discussed previously (page 49). The ranking assigned to this factor is referred to in the study as "heuristic ranking" and is a gauge of the importance that subjects placed on that particular validating scheme.

The order of presentation of Tasks 1 and 2 was varied randomly in the experimental instrument. Table 1 in the next subsection provides a cross reference between Tasks 1 and 2, as well as the other tasks, and their corresponding "sets" in the experimental instrument.[2]

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[2] The tasks were called sets in the experiment.

Hypotheses B-1, B-2, and B-3

The remaining three tasks comprise the tests of hypotheses B-1, B-2, and B-3. Two variables were manipulated experimentally in these tasks. They are (1) the degree of hardness of supplemental disclosures, and (2) the overall reliability level in the decision context. Throughout Tasks 3 through 5, management estimates of value were considered to be soft information and a firm purchase offer was considered to be hard information. I also assumed that P4-H = P4-L and P3-H = P3-L since the overall reliability level of the decision context is considered to affect only low reliability disclosures. (P4 and P3 are both high reliability.)

In Task 3, subjects were presented with three firms for credit rating assignment. The subjects were told that there were limited funds available for loans and that the three firms would be ranked based on the credit ratings they assigned. One of the three firms had extensive research and development (R&D) activities and the credit application for this firm includes financial statements prepared in accordance with GAAP (reliable) and audited by a certified public accountant (CPA) with a "clean" opinion issued. The other two firms' applications contained information not presented in GAAP form and disclosed in such a way as to appear potentially unreliable. The financial statements for these two firms had not been audited. These latter two firms were included to control for the overall reliability level in the decision context. Since the financial information for two of three firms was potentially unreliable, the overall level of reliability in this decision context was assumed to be low. First, the credit ratings were assigned without any additional information about the value of the GAAP firm's R&D projects. The credit rating of interest in this task was that assigned to the GAAP firm (CR3-1). This first part of Task 3 was considered a P3 (low relevance, high reliability) situation. Next, subjects were asked to reevaluate all three credit ratings given that management's estimate of the market value of the GAAP firm's R&D projects plus extraneous information for the non-GAAP firms had been provided. The estimate of value provided by management was assumed to be soft information and hence, potentially unreliable (P2-L). The difference between the two credit ratings for the GAAP firm (CR3-2 less CR3-1) was considered a proxy for the marginal usefulness of a relevant but unreliable disclosure in a low reliability context: MU(P2-L|P3).

Task 4 required the subjects to assign two credit ratings to a firm virtually identical to the previous GAAP firm. (The financial statement numbers in the Task 3 firm and the loan amount were multiplied by a constant to yield the Task 4 amounts.) This firm had substantial design projects (instead of "R&D"). First, the design projects were disclosed only at cost in the financial statements and a credit rating assigned. Next, the current value of the projects as evidenced by a firm purchase offer was given and a second credit rating assigned. The value of the projects (firm offer) was considered hard information (not subject to producer bias) and therefore, reliable (a P4 situation). The difference in the credit ratings (CR4-2 less CR4-1) between the "no current value" (P3) situation and the "relevant and reliable" (P4) situation was considered a surrogate for $MU(P4|P3)$.

As in Task 3, Task 5 presented three firms for credit rating assignment to control for the overall reliability level in the decision context. The subjects were again told that there were limited funds available for loans and that the three firms would be ranked based on the credit ratings they assigned. One of the firms was almost identical to the firms in Tasks 3 and 4. (Again, the financial statement numbers and loan amount were those of Task 3 multiplied by another constant.)[3] This firm had substantial patents that had been developed and were disclosed in the credit application at historical cost. All information in the task was highly reliable (i.e., GAAP statements with clean CPA opinions for all three firms) and therefore, the overall reliability level in the decision context was considered high. Subjects assigned credit ratings to the firms. Next, the subjects were asked to reassign the credit ratings given management's estimate of the market value of the patents (soft and hence, unreliable). Extraneous information for the other two firms was revealed also. Management's estimate of the value of the patents was a P2-H type of disclosure. Following the same reasoning as before, the difference in the two credit ratings (CR5-2 less CR5-1) was a proxy for $MU(P2\text{-}H|P3)$.

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[3] This "scaling" of the Task 5 information was designed so that the hypothesized effect would be counter to a "size effect." A size effect would be subjects assigning higher credit ratings to larger companies. Since I expected the additional information to be given a higher marginal credit rating in Task 3, I constructed the Task 5 financial numbers to be larger than those of Task 3.

The order of presentation of Tasks 3 and 5 was randomized. Table 1 presents a cross reference between the three tasks and their corresponding "sets" in the experimental instrument. One order of presentation was designated "A" and the other, "B." I did not attempt to randomize the order of all tasks because of the similarity of groups of experimental companies. For instance, I did not want Task 1 and Task 2 to be presented in succession. The orderings chosen ensured that one dissimilar firm was presented between two similar firms. The tasks for Hypotheses B-1, B-2, and B-3 are summarized in Figure 3.

In addition, subjects were requested to assess the "dependability (reliability)" of both the basic financial statements and the additional information for all firms in Tasks 3 and 5. The same "reliability index" scale

TABLE 1

Cross Reference: Tasks & Sets, by Order

	ORDER	
	A	B
Task 1	Set 2	Set 4
Task 2	Set 4	Set 2
Task 3	Set 3	Set 5
Task 4	Set 1	Set 1
Task 5	Set 5	Set 3

	DISCLOSURE	LEVELS	
Tasks 3, 4 & 5	cost of R&D projects, design projects, or patents	low relevance, high reliability	P3
Task 3	mgt's estimated value of R&D projects; overall reliability level is low	high relevance, low reliability	P2-L
Task 4	purchase offer for design projects	high relevance, high reliability	P4
Task 5	mgt's estimated value of patents; overall reliability level is high	high relevance, low reliability	P2-H

Figure 3: Summary of Tasks 3, 4, and 5

previously described was used for these assessments. From these, I calculated an average reliability index, by subject, for the basic financial statements in both Tasks 3 and 5. The subjects were also asked whether the overall level of dependability (reliability) in each of Tasks 3 and 5 was "undependable" or "dependable." These responses and the average reliability indexes above were used to confirm my assumptions regarding the overall level of reliability in the decision contexts.

Data Analysis

The basic testing of each hypothesis was accomplished through paired-difference t-tests.[4] When there are significant differences among subjects, paired-difference t-tests are more likely to reveal treatment differences when they exist than t-tests of the mean response by treatment.[5] Within each subject's response set, paired comparisons were formed by subtracting the second variable from the first.[6] For instance, each subject's P2-L response (CR3-2 - CR3-1) was subtracted from his P4 response

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[4] All of the data analysis in the study was performed using procedures in the Statistical Analysis System (SAS).

[5] The paired design could actually result in a loss of information if the within-pairs variability is the same as the between-pairs variability. In this case, the net loss results from the consumption of degrees of freedom needed to estimate the mean square error, without a commensurate reduction in the mean square error from the removal of the subject effect [Mendenhall, 1968].

[6] P4 = CR4-2 - CR4-1; P2-L = CR3-2 - CR3-1; P2-H = CR5-2 - CR5-1; P2-HV = CR1-2 - CR1-1; P2-LV = CR2-2 - CR2-1; RX is reliability index; and HV and LV are high validating and low validating.

(CR4-2 - CR4-1) to obtain a paired difference between the two responses. The hypotheses and their corresponding comparisons are summarized in Figure 4.

HYPOTHESES		COMPARISONS
A	validating scheme	(CR1-2 less CR1-1) > (CR2-2 less CR2-1) and RX-HV > RX-LV
B-1	MU(P2-L|P3) > MU(P2-H|P3)	(CR3-2 less CR3-1) > (CR5-2 less CR5-1)
B-2	MU(P2-L|P3) > 0	(CR3-2 less CR3-1) > 0
B-3	MU(P4|P3) > MU(P2-L|P3)	(CR4-2 less CR4-1) > (CR3-2 less CR3-1)

Figure 4: Summary of Hypotheses and Comparisons

The following general assumptions are made for the use of a t-test: (1) random sample, (2) interval scale response variable, and (3) approximately normal distribution for the response variable [Agresti and Agresti, 1979]. Although the paired differences were probably not normally distributed, the requirements for the t-test become less stringent for sample sizes above thirty, as in this experiment [Agresti and Agresti, 1979].

The comparison of the reliability indexes was included because the pilot tests did not disclose differences between P2-HV and P2-LV although subjects apparently used the anticipated validating scheme. The comparison of reliability indexes provides evidence as to the use of validating schemes, but I do not consider it as persuasive as the comparison of credit rating changes. Credit rating changes reflect the "usefulness" (final) stage of Figure 2, while reliability indexes reflect the "reliability" (intermediate) stage of Figure 2.

I coded each subject's responses to each for the two questions in Tasks 1 and 2 about the use of the additional information (management's estimate of value) and whether the additional information seemed reasonable, as follows:

Question 1 -- Was the information used?

Used information strongly (coded as "2")
Used information weakly (coded as "1")
Did not use information (coded as "0")

Question 2

Reasonable?	Used Expected Validating Scheme?
Yes (coded as "2")	Strongly (coded as "2")
Maybe (coded as "1")	Weakly (coded as "1")
No (coded as "0")	Not Used (coded as "0")

The numerical codings were correlated with the credit rating changes and reliability indexes to test the correspondence of the subjects' written responses with their actions.

Analysis of variance (ANOVA) was used to test whether the following possible effects were significant: order of presentation, bank, and experience. They were tested as main effects and as interactions with treatments.[7] The Waller-Duncan multiple comparison test was used as an overall test of the equality of the treatment means (P4, P2-L, and P2-H). A multiple comparison test can be used to control the experimentwise error rate.[8] The Waller-Duncan test is considered a refinement of the traditional Duncan's multiple range test. Waller-Duncan adopts a Bayesian viewpoint by adjusting the criterion for evaluating the significance of differences between means according to the value of a preliminary overall F-test of the mean values. If the F value is high, the criterion for judging differences between means is low, and vice versa [Waller and Duncan, 1969]. The user of the test specifies a K-ratio in advance which is the ratio of the seriousness of type 1 errors to the seriousness of type 2 errors. A ratio of 100 was used in this study. This value roughly corresponds to an alpha level of 0.05 for the two-level case [SAS, 1979]. The use of the preliminary F-test requires adherence to the t-test assumptions mentioned earlier plus the additional assumption that the underlying populations of the comparison groups possess equal variances. When the group sample sizes are all equal, as they are here, the F-test can tolerate large differences in population variances [Agresti and Agresti, 1979].

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[7] "Treatment" is used here to mean level of the experimental condition. For instance, P2-H: low reliability in a high reliability context. Interactions are measures of the impact these effects have on the treatment differences.

[8] There is a risk of rejecting the null hypotheses at higher than anticipated error levels if individual t-tests are used.

Summary

This chapter explained the methodology used in testing the research hypotheses. Subjects were credit analysts in major commercial banks. There were 50 usable responses for the final experiment. Subjects assigned credit ratings to companies before and after receiving additional information about certain market values. Changes in credit ratings were used as surrogates for the marginal usefulness of the additional information. Differences in the credit rating changes between experimental tasks provided evidence about the corresponding hypotheses. The main-effect differences were tested using paired-difference t-tests. Certain other effects were tested using ANOVA's. An overall test of Hypotheses B-1, B-2, and B-3 was performed using the Waller-Duncan multiple comparison test.

CHAPTER IV
RESULTS

In this chapter, the results of the experiment are presented in sections corresponding to the two major research issues: the use of reliability validating schemes and the effect of the overall level of reliability in the decision context. The extent to which the data support the specific research hypotheses is of primary interest. Additional analyses have also been performed in an attempt to add useful insights not considered in the formulation of the original hypotheses.

The Use of Validating Schemes

Research Hypothesis A

> Financial statement users will cognitively employ validating schemes to test the reliability of the disclosures.

The hypothesis was tested by using credit analysts as financial statement users and comparing the increase in credit ratings for the "high validation" firm (HV) to the increase in the credit rating for the "low validation" firm (LV).[1] A result of P2-HV > P2-LV would provide the strongest support of the hypothesis. In addition, a comparison of the reliability indexes assigned to the additional information (management estimate of land value) resulting in RX-HV > RX-LV would also support the hypothesis. As discussed in Chapter III, I consider tests using the credit rating changes to be stronger evidence of an effect than tests using corresponding reliability indexes. This is because the credit rating changes reflect the usefulness (final) stage of Figure 2 in Chapter I, while reliability indexes reflect the reliability (intermediate) stage of Figure 2. The average subject responses, by task, for the "before" and "after" credit ratings, the change in credit ratings, and the reliability indexes are presented in Table 2.

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[1] High validation--doubling of land value in ten years; low validation--doubling of land value in two years.

TABLE 2

Average Subject Responses: Hypothesis A

	Credit Rating Before	Credit Rating After	Change (P2)
HV Firm (Task 1)	5.90	6.67	0.77
LV Firm (Task 2)	5.84	6.60	0.76

	Mean Reliability Index (RX)
HV Firm (Task 1)	4.13
LV Firm (Task 2)	3.23

Paired-difference t-tests were performed on the comparisons "P2-HV > P2-LV" and "RX-HV > RX-LV." These results are reported in Table 3.

TABLE 3

T-tests for Validating Scheme

Paired Comparisons:	T Value	Significance Level
P2-HV > P2-LV	0.07	0.47
RX-HV > RX-LV	4.51	<0.01*

* = significant at 0.05

The test of "P2-HV > P2-LV" was not significant (t = 0.07, p = 0.47). The test of "RX-HV > RX-LV" was highly significant (t = 4.51, p < 0.01). This confirms that subjects considered the HV land value to be more reliable that the LV land value. But this increased reliability was not translated into a higher credit rating change for the HV firm over the LV firm. Therefore, the hypothesis is supported by a comparison of the reliability indexes but not by a comparison of the credit rating changes.

Order effect. I controlled for a possible order effect by randomizing the order of presentation of the HV and LV firms in the experiment. Subjects who received the HV firm first, then the LV firm were assigned an order code of "A." Subjects who received the other ordering (LV then HV) were assigned an order code of "B." The order code was treated as a classification variable. I ran ANOVA's for both the credit rating changes and the reliability indexes to test "order" as a main effect and as an interaction with treatments. These ANOVA's appear in Table 4 for credit rating changes and Table 5 for reliability indexes.

TABLE 4

ANOVA for Order Effect: Credit Rating Changes

ANOVA

Source	DF	Sum of Squares	Mean Square	F	Significance Level
Order	1	3.05	3.05	3.48[a]	0.07
Subjects within ord	48	42.06	0.88	1.60[b]	0.05*
Treatments	1	0.00	0.00	0.00[b]	0.95
Order x Trtment	1	2.41	2.41	4.42[b]	0.04*
Trt x Subj w/i ord	48	26.21	0.55		
Total	99	73.73			

R-square = 0.64 Overall F for Model = 1.71, significant at 0.03

Error Terms: [a] Subjects within order

[b] Treatments x Subjects within order

* = significant at 0.05

TABLE 5

ANOVA for Order Effect: Reliability Indexes

ANOVA

Source	DF	Sum of Squares	Mean Square	F	Significance Level
Order	1	1.51	1.51	0.80[a]	0.37
Subjects within ord	48	90.25	1.88	1.85[b]	0.02*
Treatments	1	20.25	20.25	19.94[b]	<0.01*
Order x Trtment	1	0.00	0.00	0.00[b]	0.98
Trt x Subj w/i ord	48	48.75	1.02		
Total	99	160.76			

R-square = 0.70 Overall F for Model = 2.16, significant at <0.01

Error Term: [a] Subjects within order

[b] Treatments x Subjects within order

* = significant at 0.05

Referring to Table 4, order does not represent a significant main effect (F = 3.48, p = 0.07) in the analysis of credit rating changes. The interaction between order and treatments was significant (F = 4.42, p = 0.04). A significant interaction means that the relationship between the HV and LV credit rating changes is conditioned by the order of presentation of the tasks.

To elaborate on this interaction further, Table 6 shows the mean response for each treatment, HV or LV, within each of the two orderings. The table reveals that subjects

TABLE 6

Response Means for Order vs. Treatment

		ORDER	
		HV then LV	LV then HV
VAL SCHEME	HV	0.75	0.79
	LV	0.42	1.08

tended to assign an average credit rating change for the HV treatment that was relatively consistent across ordering; that is, the mean HV effect was about the same whether subjects were presented HV before or after LV. However, the credit rating change for the LV treatment was *lower* than HV when LV was presented second, and *higher* than HV when LV was presented first. One way to approach this situation is to use only the subject's first response in the HV-LV pair, and then to compare the HV mean response with the LV mean response. This could be justified under the presumption that the subject's second response in the HV-LV pair has been influenced by his first response. This procedure yielded a mean value of 0.75 for HV (upper left cell in Table 6) and 1.08 for LV (lower right cell), which is counter to the hypothesized direction. A test of these two means did not disclose a significant difference ($F = 1.76$, $p = 0.19$). However, this may be due to the reduced control for subject differences inherent in this test.[2] Even so, this comparison of the means may imply that subjects viewed the LV information as more relevant than the HV information. This possibility is discussed later in this section.

The ANOVA for the reliability indexes in Table 5 reveals that order is not a significant main effect ($F = 0.80$, $p = 0.37$) and that the order-treatment interaction is not significant ($F = 0.00$, $p = 0.98$). Therefore, the significant difference in the reliability indexes for HV and LV may be accepted without consideration of an order effect.

Analysis of written responses. Subjects were asked to provide written responses to two questions immediately following the credit rating assignments in Tasks 1 and 2. The answers for Question 1[3] were coded as follows: If the subject indicated a strong use of the information, the answer was coded as a "2"; a weak use was coded as a "1"; and no use was coded as a "0." A summary of the coded responses by task is presented in Table 7.

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[2] The previous paired-difference t-tests controlled for subject differences. They compared the credit rating changes within subjects. A test that controls for existing subject differences is more likely to reveal significant differences in treatments when differences do, in fact, exist because the mean square error is deflated by the removal of subject differences.

[3] Question 1: "Please write a short explanation of how you used the additional information (land value) on page 2 in reassessing the credit rating of the firm."

TABLE 7

Summary of Coded Responses for Question 1

RESPONSE	HV Firm	LV Firm
2	23	19
1	8	10
0	18	20

The answers for Question 2[4] were coded in two parts. First, the response was assigned a numeral based on the following: If the subject felt that the information was reasonable, the response was coded as a "2"; a response indicating that the information might be reasonable was coded as a "1"; and a response that the information was not reasonable was coded as a "0." This first coding of Question 2 was designated Question 2-A. Secondly, the subject's response was checked to see if the subject had compared the estimate of the land value with the land's original cost and date of purchase. If the subject indicated such a comparison (validating scheme), the response was coded as a "2"; a weak indication of the comparison was coded as a "1"; and no evidence of the comparison was coded as a "0." This second coding of Question 2 was designated Question 2-B. The coded responses for Question 2 are summarized in Table 8.

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[4] Question 2: "Did management's estimate of the land value seem reasonable to you in light of the available facts? Did you feel that you could depend on it? Why or why not?"

TABLE 8

Summary of Coded Responses for Question 2-A & B

	Question 2-A		Question 2-B	
RESPONSE	HV	LV	HV	LV
2	28	5	28	24
1	11	15	0	4
0	10	29	21	21

I calculated Pearson product-moment correlation coefficients (rho) between the Questions 1 and 2 coded responses, and the credit rating changes and reliability indexes. The correlations are presented in Table 9.

These correlations demonstrate a strong relationship between the subjects' actual credit rating changes and the coded responses for Question 1 (rho = 0.67, $p < 0.01$ for HV and rho = 0.80, $p < 0.01$ for LV). They also demonstrate a

TABLE 9

Correlations for Coded Responses in Questions 1 & 2

This table contains the Pearson product-moment correlation coefficients between the coded responses for Questions 1 & 2 and the credit rating changes and reliability indexes.

	P2-HV	RX-HV
Q1-HV	0.67 (p<0.01)	0.31 (p=0.03)
Q2A-HV	0.25 (p=0.09)	0.72 (p<0.01)
Q2B-HV	0.11 (p=0.46)	0.33 (p=0.02)
	P2-LV	RX-LV
Q1-LV	0.80 (p<0.01)	0.37 (p<0.01)
Q2A-LV	0.34 (p=0.02)	0.60 (p<0.01)
Q2B-LV	-0.28 (p=0.06)	-0.46 (p<0.01)

strong relationship between the reliability indexes and the coded responses for Question 2-A (rho = 0.72, $p < 0.01$ for HV and rho = 0.60, $p < 0.01$ for LV). In addition, there was a significant correlation between the reliability indexes and the coded responses for Question 2-B (rho = 0.33, $p = 0.02$ for HV and rho = -0.46, $p < 0.01$ for LV). These latter correlations are particularly important since they demonstrate that subjects who used the validating scheme were inclined to assign higher reliability indexes for the HV information (positive correlation) and lower reliability indexes for the LV information (negative correlation). This is additional support for my assertion that the difference in reliability indexes between HV and LV was driven by the subjects' use of a validating scheme. The coded responses for Question 2-B are also correlated with the credit rating changes in the same way but with lower significance levels.

Validation scheme ranking. Question 4 in the "Additional Questions" section asked the subjects to assign ranks of importance to factors they used in assessing the "reasonableness" of the additional information in either Task 1 (order code = A) or Task 2 (order code = B). The "land comparison" validating scheme was listed as a possible factor. Ranks assigned by the subjects to that factor are summarized in Table 10. Whether a subject's response was directed to Task 1 or Task 2 did not significantly affect the results ($z = 0.01$, $p = 0.99$, using the normal approximation of the Kruskal-Wallis test).

The ranking of the land comparison validating scheme was significantly associated with the difference between the HV and LV credit rating changes. The Pearson product-moment correlation coefficient between the "P2-HV vs. P2-LV" comparison (i.e., P2-HV less P2-LV computed by subject) and the validating scheme rankings was -0.36 ($p = 0.01$). This

TABLE 10

Summary of Ranks for Validation Scheme

Rank	Number of Subjects
1	22
2	17
3	3
4	4
5	1
Not Ranked	3
Total	50

suggests that subjects who ranked the land comparison validating scheme as important tended more to respond in the hypothesized manner: namely, a greater effect for P2-HV over P2-LV. To elaborate further on this, Table 11 presents the average credit rating changes for HV and LV corresponding to subject rankings of the land comparison validating scheme. Note in this table that subjects who ranked the land comparison validating scheme as "1" or "2" showed an average difference between HV and LV credit rating changes in the hypothesized direction. There is evidence, then, that a subject's credit rating changes are associated with the importance that the subject assigns to the validating scheme. A subject who considers the land comparison validating scheme important is more likely to assign a higher credit rating change to the HV firm over the LV firm.

TABLE 11

Validation Scheme Rankings by Treatment

Ranking	N	Credit Rating Changes HV	Credit Rating Changes LV	Difference
1	22	0.80	0.59	0.21
2	17	0.94	0.88	0.06
3	3	0.66	0.33	0.33
4	4	0.50	0.50	0.00
5	1	1.00	3.00	-2.00
Not Ranked	3	0.00	1.33	-1.33
	50			

Discussion of credit rating change results. The significance of the comparison of reliability indexes in supporting the research hypothesis is inconsistent with the overall non-significance of the difference in credit rating changes. Overall, only 14 of 50 subjects (28%) assigned credit rating changes in the hypothesized direction as compared with 30 of 50 subjects (60%) who assigned reliability indexes in the hypothesized direction. This difficulty in linking the reliability indexes with the credit rating changes suggests that one or more of the following unanticipated factors were present:

1. The relevance of the additional information was so insignificant that differences in reliability were not important.
2. The reliability effect had little impact on decision usefulness, possibly because neither reliability level was high enough to justify a change in credit rating.
3. Subjects considered the land value given as additional information for the LV firm to be more relevant than the land value for the HV firm. For instance, they may have felt that the LV land appreciation reflected superior management performance.
4. The order effect may illustrate the presence of "experimental demand." In order code A, subjects may have focused on reliability differences. In order code B, they may have focused on management performance in investing in land.

Both credit rating changes, averaging 0.77 for P2-HV and 0.76 for P2-LV, were significantly different from zero ($t = 7.13$, $p < 0.01$ for HV, and $t = 5.60$, $p < 0.01$ for LV). This implies that the additional information was relevant, overall. However, 40 percent of the subjects did not change the credit rating for the HV firm (i.e., P2-HV = 0), implying that factors (1) and (2) above may be problems. The coded responses for Question 1 of the HV scenario revealed that 37 percent of the subjects felt that the additional information was of little relevance to the credit rating assignment, corresponding to a coding of "0" for HV in Table 7. This result supports Factor 1 in the previous list. The coded responses for Question 2-A also revealed that 20 percent of the subjects heavily discounted the reliability of the additional information in the HV case (a coding of "0" for HV in Table 8). Reasons given included the following: the information "was only management's opinion" or "an appraisal of the land" was needed. These subjects were skeptical of the land value even though they could successfully apply the land comparison validating scheme to it. These responses tend to support Factor 2 in the list (reliability level not high enough). In addition, 12 of 50 subjects (24%) actually increased the LV credit rating more than the HV credit rating (P2-LV > P2-HV), tending to imply that factor (3) may also be a problem.

Since the experimental design did not control explicitly for these possible problems, I attempted to approximate that control by testing P2-HV vs. P2-LV again after removing observations that met one or both of the following criteria:

1. The response for Question 2-A in both scenarios indicated that the subject considered the LV information's reliability to be greater than or equal to the reliability of the HV information. This resulted in removing 21 responses.
2. The LV credit rating change was greater than the HV credit rating change. This type of response implies that the subject considered the LV information to be more relevant or more reliable than the HV information. However, the first deletion controls for reliability. This means that any additional deletions relate to relevance.[5] This criterion resulted in removing 4 more responses. (Eight were removed in No. 1.)

The deletion of the responses described by No. 1 caused the test value of t to increase from 0.07 ($p = 0.47$) to 1.00 ($p = 0.16$). The deletion of the responses described by No. 2, but not removed in No. 1, caused the test value of t to increase from 1.00 ($p = 0.16$) to 3.21 ($p < 0.01$). If the No. 2 responses are deleted first, the t value increases to 1.13 ($p = 0.13$). The combined effect of both deletions caused the difference between the HV and LV credit rating changes to be significant ($p < 0.01$) in the hypothesized direction.

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[5] But they may be tied to the order effect. Of the 12 responses satisfying this criterion, 9 were order code = B, and 3 were order code = A. The probability of this many B's or more occurring by chance, given that A and B occur with equal frequency in the original data set, is 0.07 (calculated using the binomial distribution). Also, order code B is associated with LV responses being higher than HV responses. See Table 6.

Validation Scheme

I have inferred that subjects assigned higher reliability indexes to the land values for the HV firm because they used a "validating scheme": that is, a search for evidence that the disclosure's reliability level is actually higher than it appears. The experiment was constructed to allow subjects to compare management's value estimate with the original cost and date of acquisition of the land. In the HV case, ten years had elapsed since purchase while in the LV case, two years had elapsed.

The coded responses for Question 2-B revealed that 57 percent of the subjects in the HV scenario compared the estimated value of the land to its original cost and purchase date in evaluating the reasonableness of the estimated value and 57 percent in the LV scenario (coded response of 2 or 1 in Table 8). Further analysis reveals that 72 percent of the subjects considered this relationship in at least one of the two scenarios. In Question 4 of the "Additional Questions" section, 98 percent of the respondents (Table 10) claimed to have considered the "reasonableness" of the value estimate in Set 2.[6] Of these, 44 percent ranked "comparison of 'land value' with original cost of land" as the most important factor that they had considered and 34 percent ranked this factor as second in importance. In other words, 77 percent ranked this factor first or second.

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[6] For half of the subjects, Set 2 was the HV scenario (order code = A) and for the other half, Set 2 was the LV scenario (order code = B).

The validating scheme apparently used by 72 percent of the subjects incorporated the original cost of the land, the date of acquisition, and the general description of the land. As such, it is similar to the heuristic described as "adjustment from an anchor." Evidently, subjects viewed the original cost as an "anchor" or starting point. From there, they seemed to evaluate whether it was likely that vacant land in a "steady, commercial area" would double in value in ten years (HV scenario). Some of the subjects actually calculated an annual appreciation rate for the land and deemed it to be reasonable. A few subjects felt that the HV appreciation was even "conservative" for sound commercial property.

For the LV scenario, 22 of the 28 subjects[7] (79%) who applied this validating scheme felt that a doubling of the land's value in two years was overly optimistic: that the increase was not reasonable. On the other hand, 8 of 50 subjects[8] (16%) felt that such an increase was possible or even likely. Three subjects who felt that such an increase was not likely, looked for other ways to "validate" management's estimate such as considering the company's financial strength, the amount of mortgage on the property, or the company's history.

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[7] Thirteen of the 28 were order code A.

[8] Two of the 8 were order code A. The probability of this few A's or fewer occuring by chance is 0.14 using the binomial distribution.

Other possible effects. I tested both the credit rating changes and reliability indexes for possible bank and experience effects. The ANOVA for credit rating changes including the classification variable, bank yielded a non-significant bank main effect (F = 0.46, p = 0.71) and a non-significant interaction with treatments (F = 1.95, p = 0.14). The ANOVA for reliability indexes including bank as an effect also did not yield a significant bank main effect (F = 0.50, p = 0.69) or interaction with treatments (F = 0.98, p = 0.41). Since the bank-treatment interaction for credit rating changes is reasonably close to being significant, I have included a cross-classification table for this possible effect in Table 13.

To test for an experience effect, I partitioned the data set according to the subjects' level of experience. Subjects in the lower third of experience were assigned an experience classification of LOW; subjects in the upper third of experience were assigned an experience classification of HIGH; and the middle third was deleted. The ANOVA for credit rating changes with the experience classification variable included as an effect yielded a non-

TABLE 13

Credit Rating Changes by Bank and Treatment

		HV	LV
BANK	A	0.80	0.60
	B	0.61	0.71
	C	0.56	1.22
	D	1.00	0.65

significant experience main effect (F = 0.01, p = 0.93) and a non-significant interaction with treatments (F = 0.02, p = 0.90). The ANOVA for reliability indexes with experience as an effect also did not yield a significant experience main effect (F = 4.16, p > 0.05) or significant interaction with treatments (F = 0.02, p = 0.89). Since the significance level of the experience main effect for reliability indexes is very close to 0.05, I have included a classification table comparing the mean reliability indexes for the two levels of experience (Table 14).

TABLE 14

Average Reliability Indexes by Experience

		Average Reliability Indexes
EXPER	High	3.375
	Low	3.900

Summary for Hypothesis A

The reliability indexes for the HV firm were significantly higher than the indexes for the LV firm, supporting the validating scheme hypothesis. The credit rating changes for the HV firm were not significantly greater than the changes for the LV firm and the credit rating changes were impacted by the order of presentation of the tasks. A separate test of credit rating changes was conducted after deleting observations for which subjects either rated the reasonableness of the HV information equal to or lower than the reasonableness of the LV information, or assigned a lower credit change for the HV firm versus the LV firm. This test yielded a significant difference in credit ratings in the hypothesized direction.

An overwhelming majority of subjects (72 percent by one measure, 98 percent by another) apparently used the validating scheme of comparing the original cost of the land with management's estimate of the land's value while taking into consideration the time elapsed since purchase. This validating scheme appears to be similar to the "adjustment from an anchor" heuristic, with the original cost of the land as the anchor. Credit rating changes were apparently conditioned by the importance that the subjects placed on the land comparison validating scheme. The overall results are consistent with the use of a validating scheme in the assessment of reliability, but the effect on the credit rating assignments was affected by subject-specific variables, such as willingness to use a validating scheme.

Overall Level of Reliability in the Decision Context

This section is concerned with the three hypotheses B-1, B-2, and B-3, involving treatments P4 (Task 4), P2-H (Task 5), and P2-L (Task 3). From previous discussions, P4 is the credit rating change for a high relevance, high reliability disclosure; P2-H for a high relevance, low reliability disclosure in a high reliability decision context; and P2-L for a high relevance, low reliability disclosure in a low reliability decision context. The average subject responses, by task, for the "before" and "after" credit ratings and the change in credit ratings are presented in Table 15. The discussion in this section is organized around the research hypotheses B-1 through B-3.

TABLE 15

Average Subject Responses: Hypotheses B-1, B-2, & B-3

	Credit Rating Before	Credit Rating After	Change
P4 Firm (Task 4)	3.95	5.86	1.91
P2-H Firm (Task 5)	4.05	5.39	1.34
P2-L Firm (Task 3)	4.28	5.11	0.83

Research Hypothesis B-1

> The marginal usefulness of a high relevance, low reliability disclosure is affected by the overall reliability level in the decision context: the marginal usefulness is greater when the overall reliability level is low than when it is high. Symbolically,
>
> $$MU(P2\text{-}L|P3) > MU(P2\text{-}H|P3)$$

This hypothesis was tested by comparing the credit rating changes in the low reliability environment (P2-L) with the corresponding credit rating changes in the high reliability environment (P2-H). Table 16 shows the results of the paired-difference t-test comparing the P2-L credit rating change with the P2-H credit rating change.

The t-test disclosed a significant treatment effect in a direction opposite to the hypothesized direction ($t = 3.08$, $p < 0.01$ for the one-tailed test, P2-H > P2-L). This implies that the additional information was discounted more

TABLE 16

T-Test: P2-L vs. P2-H

Paired Comparison:	T Value	Significance Level
P2-L > P2-H	-3.08	0.50
P2-H > P2-L	3.08	< 0.01*

* = significant at 0.05

in the low reliability decision context than in the high reliability decision context. To test the sensitivity of the treatment effect to the deletion of outliers, I removed observations whose contribution to the "L vs. H" comparison was greater than two standard deviations. This resulted in deleting three observations and a lowering of the significance level to 0.01.

Subject reaction to reliability level in context. Subjects viewed the overall levels of reliability in the decision contexts as expected. A paired-difference t-test applied to the average reliability indexes (basic financial statements) for the low and high reliability environments revealed that subjects considered the low reliability environment to be significantly less reliable than the high reliability environment ($t = 14.95$, $p < 0.01$). In addition, the average reliability index of the reliable environment was significantly greater than the midpoint of the reliability scale ($t = 13.93$, $p < 0.01$). The average reliability index of the unreliable environment was significantly less than the midpoint of the scale ($t = 3.86$, $p < 0.01$). I also analyzed the responses to the question, "How would you assess the overall dependability (reliability) of the financial information provided in this set?" which was presented immediately following the reliable and the unreliable environments. (Subjects could answer only "undependable" or "dependable.") Sixty-four percent of the pairs of responses were as expected: "undependable" for the unreliable environment and "dependable" for the reliable environment. This percentage is significantly greater than the expected result of 25 percent if the responses had been at random ($z = 5.73$, $p < 0.01$, using the normal approximation of the binomial distribution). These results support my assumptions regarding the overall reliability levels in the decision contexts.

Size effect. As stated in Chapter III, the financial statement numbers for P2-L and P2-H were scaled so that any size effect would be in the direction opposite to the hypothesized treatment effect. The results indicate a treatment effect in the same direction as a possible size effect.[9] I compared the initial credit ratings between the two experimental companies. There was not a significant difference between them (t = 0.88, p = 0.38), mitigating the possibility that there may have been a size effect.

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[9] A size effect would occur when the credit analysts assigned higher credit ratings to the companies merely because they were larger, even though all financial

Order effect. As in the test of Hypothesis A (validating scheme), I controlled for a possible order effect by randomizing the order of presentation of the P2-L and P2-H firms. Subjects who received the P2-L firm first were assigned an order code of "A." Subjects who received the P2-H firm first were assigned an order code of "B." An ANOVA was run to test order as a main effect and as an interaction with treatments. These results are shown in Table 17. The ANOVA disclosed a non-significant order main effect (F = 0.33, p = 0.57) and a non-significant interaction with treatments (F = 0.17, p = 0.68).

Other possible effects. I tested the data for possible bank and experience effects. The ANOVA with the classification variable "bank" yielded a non-significant bank main effect (F = 1.71, p = 0.18) and a non-significant interaction with treatments (F = 0.45, p = 0.72).

The ANOVA including experience as a "HIGH-LOW" classification variable (see earlier discussion) showed a non-significant experience main effect (F = 0.29, p = 0.60) and a non-significant interaction with treatments (F = 0.46, p = 0.50).

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information was of the same relative proportions.

TABLE 17

ANOVA for Order Effect: P2-L & P2-H

ANOVA

Source	DF	Sum of Squares	Mean Square	F	Significance Level
Order	1	0.52	0.52	0.33[a]	0.57
Subjects within ord	48	75.39	1.57	2.25[b]	<0.01*
Treatments	1	6.50	6.50	9.32[b]	<0.01*
Order x Treatment	1	0.12	0.12	0.17[b]	0.68
Trt x subj w/i ord	48	33.50	0.70		
Total	99	116.03			

R-square = 0.71 Overall F for Model = 2.32
Significant at <0.01

Error Term: [a] Subjects within order

[b] Treatment x Subjects within order

* = significant at 0.05

Discussion of treatment effect. I believe that the result of a treatment effect in the direction opposite to that hypothesized can be explained through framing and prospect theories. The original development of this hypothesis in Chapter II was based on the presumption that the information user would focus more on reliability as a criterion for usefulness when the overall level of reliability in the decision context was high than when it was low. The low reliability additional information would be assigned a lower usefulness level in the high reliability context since the user would "sort" that information into the low usefulness "compartment" in the editing phase of the decision evaluation. The data suggest, however, that the subjects focused more on reliability as a criterion for usefulness in the _low_ reliability decision context. So, it would appear that the sorting of the information into the low usefulness compartment takes place in the low reliability context rather than in the high reliability context. This yields the overall outcome of $MU(P2\text{-}L|P3) < MU(P2\text{-}H|P3)$.

This assumption of subject preoccupation with reliability in the low reliability decision context is supported by the responses to Questions 1a and 2[10] in the "Additional Questions" section of the instrument. The average response for Question 1a was between "somewhat likely" and "very likely" that management's estimate of value is greater than a third party estimate (mean of 4.00 on a scale of 1 to 5). In Question 2, the average response was 5.6 on a scale of 1 to 7, where 1 indicated that the reliability of financial information was "not important" and 7 was "very important." In a debriefing conference with the first pre-test group, I noted a strong recognition from the subjects that one of the sets contained largely unreliable information. Evidently, the analysts are accustomed to working with information that is perceived by them as being highly reliable. They seem to notice immediately instances of information or sets of information that are unreliable since this information differs markedly from the norm of high reliability. It follows, then, that the decision frame for the _low_ reliability decision context probably focused more on the reliability level of the additional information than for the _high_ reliability decision frame. This apparently led to the additional information in the low reliability context being sorted into the low usefulness compartment with a corresponding lessened impact on credit rating.

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[10] Question 1a: "How would you assess the likelihood that (an) estimate (of asset value) made by management is _greater_ than an estimate of the same asset's value that would be made by a third party, such as an appraiser?"

Question 2: "In general, how important is the dependability (reliability) of financial information supplied by a company's management to the assessment of credit worthiness?"

The result of P2-H > P2-L suggests the possibility of a "halo effect." Even though the additional information was basically unreliable, the information's marginal usefulness was higher when the decision context contained basically reliable information and lower when the decision context contained basically unreliable information.

Discriminant analysis for frame effect. Although the overall results suggested a frame effect in the direction opposite from that hypothesized, a few subject responses were in the hypothesized direction. In an attempt to identify subject variables that might be associated with the difference in frame effect, I partitioned the data set as follows: observations with no difference in credit rating changes were deleted; observations with the reliable environment credit rating change greater than the unreliable environment credit rating change were classified as "R > U"; and observations with the credit rating change in the opposite direction were classified as "U > R." My objective was to locate a group of subject variables that would have strong discriminatory power in identifying whether a subject's response would tend toward "R > U" or "U > R."

I applied a stepwise discriminant procedure to a subset[11] of the partitioned data sets, with the subset containing sixteen interval-scale variables. The significance level for a variable to enter the model and to remain in the model was 0.10. The procedure yielded a discriminant function that correctly classified all of the "U > R" observations and all but one of the "R > U" observations. The average squared canonical correlation[12] was 0.51 ($p < 0.01$). The four variables in the discriminant function and a description of their differences between the "U > R" and "R > U" subgroups is presented in Table 18. The variables are listed in order of the significance of their respective entry into the model.

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[11] I started with all variables in the data set. Then, I eliminated variables that were either categorical or closely related to the computation of the credit rating changes, except that I retained the "before" credit ratings (i.e., credit ratings assigned before the additional information was disclosed). Discriminant analysis cannot accept categorical variables.

[12] This a measure of the degree of separation of the two groups. It is roughly analogous to R-square in ANOVA.

TABLE 18

Variables in Frame Effect Discriminant Model

Variable	Group Differences
1. Reliability index of additional information in reliable environment	"U > R" subjects rated it as less reliable than did "R > U" subjects
2. Difference in reliability indexes between equivalent financial statements in the two environments (Statement RX-L minus Statement RX-H)	U > R: Statement RX-H > Statement RX-L R > U: Statement RX-L > Statement RX-H
3. Initial credit rating assigned to experimental firm in reliable environment (CR5-1)	"U > R" subjects assigned higher initial credit rating
4. Difference between credit rating changes assigned to hard info. (P4) and average of soft info. (ave. of P2-L & P2-H)	"U > R" subjects demonstrated less difference

The discriminant analysis revealed that with respect to the "R > U" subjects, the "U > R" subjects tended to

1. Assign lower reliability indexes to the additional information in the reliable environment (lower RX-H)

2. Assign reliability indexes to the basic financial information so that Statement RX-H > Statement RX-L (R > U subjects tended to respond in the opposite direction)
3. Assign higher initial credit ratings (CR5-1) in the reliable environment
4. Show less difference between P4 and the average of P2-H and P2-L

There is not enough information in this study to interpret these results or to identify subject characteristics that could account for the observed dichotomy of responses. These tasks will be left to further research.

Research Hypothesis B-2

> When the overall reliability level in the decision context is low the marginal usefulness of a high relevance, low reliability disclosure is greater than zero.

$$MU(P2\text{-}L|P3) > 0$$

Both the P2-L and P2-H effects were significantly greater than zero, using paired-difference t-tests ($t = 5.95$, $p < 0.01$ for P2-L and $t = 8.44$, $p < 0.01$ for P2-H). See Table 19. These results support the hypothesis that even biased disclosures can have a significant decision impact.

The original hypothesis included only P2-L because I was concerned that a negative effect of the decision context in

P2-H might overwhelm the positive influence of the "low credibility" source. It now appears, however, that this negative effect was stronger in P2-L than in P2-H. Therefore, I have included tests of both P2-L and P2-H.

TABLE 19

Tests that P2-L and P2-H are greater than zero

Paired Comparisons:	T Value	Significance Level
P2-L > 0	5.95	<0.01*
P2-H > 0	8.44	<0.01*

* = significant at 0.05

Source credibility assumptions. This hypothesis and the next one are based to a large extent on the source credibility literature. I confirmed three key assumptions related to source credibility made in Chapter II, through the "Additional Questions" section of the experimental instrument. First, I checked to see if subjects expected management value estimates to be higher than those of an independent appraiser (Question 1a). Only one subject out of 50 did not feel that management estimates were likely to be greater than independent third party estimates. So, 98 percent of the subjects expected higher value estimates from management. The mean response was between "Somewhat Likely" and "Very Likely" (4.00 on a scale of 1 to 5).

In Question 1b, I confirmed that subjects felt that a case of management's value estimate being greater than a third party's estimate was more a result of management bias than lack of expertise. The mean response was 2.75 on a scale of 1 to 4, where "2" represented more lack of expertise than bias, and "3" represented more bias than lack of expertise. A t-test revealed that the average response was significantly greater than 2.5, the midpoint of the scale ($t = 3.03$, $p < 0.01$), implying that bias is of more concern to the subjects than lack of expertise.[13] In addition, 68 percent of the subjects responded with either a 3 or 4 (bias) versus 26 percent who responded with either a 1 or 2 (lack of expertise). (Six percent responded with a 2.5.) These are important results because my application of the source credibility findings in this study holds expertise constant and focuses on bias.

Then, in Question 3, I asked the subjects if they tended to feel that management estimates of value are probably biased upward. Ninety-two percent answered "yes" and 8 percent answered "no." The overall responses indicate a subject recognition of a management inclination toward overvaluation of assets because of an inherent tendency to bias the estimates.

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[13] Although the scale contained only 4 points, its design was intended to force subjects to choose either bias over lack of expertise or vice-versa.

Research Hypothesis B-3

> When the overall reliability level in the decision context is low and validating schemes are not present, the marginal usefulness of a high relevance, low reliability disclosure is less than a high relevance, high reliability disclosure.

$$MU(P4|P3) > MU(P2\text{-}L|P3)$$

Only P2-L was originally included in the hypothesis because the P2-L credit rating change was expected to exceed the P2-H change. Since the opposite actually occurred, I included tests of P4 versus P2-L, P2-H, and the average of P2-L and P2-H. These test results are summarized in Table 20.

TABLE 20

T-Tests and ANOVA: P4, P2-L, P2-H

Paired Comparisons:	T Value	Significance Level
P4 > P2-L	4.42	<0.01*
P4 > P2-H	2.26	0.01*
P4 > ave. P2	3.52	<0.01*

* = significant at 0.05

P4 is significantly greater than P2-L, P2-H, and the average of P2-L and P2-H. These results support the hypothesis that a high relevance, low reliability disclosure has less decision impact than the corresponding high relevance, high reliability disclosure. I checked for the effect of outliers by deleting observations in the P4 vs. P2-H comparison that exceeded two standard deviations in either direction. This actually improved the attained significance level of the t-test to less than 0.01.

Table 21 contains an overall ANOVA with treatments, P4, P2-L, and P2-H, and subjects as blocks. The overall F-test for treatments was highly significant ($F = 11.60$, $p < 0.01$). The Waller-Duncan multiple comparison test of treatment means is shown in Table 22. This test uses the F value for treatments and the mean square error from the ANOVA in Table 21. The K-ratio was pre-specified at 100. The Waller-Duncan test disclosed a significant difference between all treatments, with P4 > P2-H > P2-L.

Other possible effects. Order is not applicable to the overall ANOVA in this section since only the order of the P2-L and P2-H treatments was randomized. Possible bank and experience effects were tested through ANOVA's, as before. The ANOVA including the classification variable "bank" as an effect showed the bank main effect to be non-significant ($F = 1.09$, $p = 0.36$) and the interaction with treatments to be non-significant ($F = 0.44$, $p = 0.85$). The ANOVA

TABLE 21

ANOVA for Overall Treatment Effect: P4, P2-H, & P2-L

ANOVA

Source	DF	Sum of Squares	Mean Square	F	Significance Level
Subjects	49	97.06	1.98	1.57	0.03*
Treatments	2	29.19	14.60	11.60	<0.01*
Error	98	123.31	1.26		
Total	149	249.56			

R-square = 0.51 Overall F for Model = 1.97
Significant at <0.01

* = significant at 0.05

TABLE 22

Waller-Duncan Test for Overall Treatment Differences

WALLER-DUNCAN TEST

Grouping*	Mean	N	Trt
A	1.91	50	P4
B	1.34	50	P2-H
C	0.83	50	P2-L

* Means within same letter grouping are not significantly different.

K-ratio = 100 DF = 98
Mean Square Error = 1.26
F = 11.60 Critical t value = 1.84
Least Significant Difference = 0.41

including experience ("HIGH-LOW" classification variable) showed a non-significant experience main effect (F = 1.07, p = 0.30) and a non-significant interaction with treatments (F = 0.46, p = 0.63).

Summary for Hypotheses B-1, B-2, and B-3

The credit rating changes in the reliable decision context were greater that the credit rating changes in the unreliable decision context. This supports the conclusion that unreliable information has a stronger marginal impact when the overall level of reliability in the decision context is high than when it is low. This is opposite to the effect originally hypothesized, but can be explained by reference to the same general phenomena. Apparently, reliability is a more important factor in the "editing phase" of the decision process when the overall reliability level of the decision context is low than when it is high. (The original hypothesis formulation assumed the opposite.) The information is recognized as being unreliable and is sorted into the "low usefulness" compartment by the user. This "sorting" apparently takes place in the low reliability context rather than in the high reliability context. This leads to the information in a low reliability context having a smaller decision impact than the same information in a high reliability context. This result suggests a "halo effect" associated with the high reliability context.

In addition, the average credit rating change for the relevant but unreliable information was greater than zero, but less than the average credit rating change for the relevant and reliable information. These results support the hypotheses that even information from a biased source could have a decision impact but not as great an impact as from an unbiased source. Supporting these conclusions were subject responses indicating a strong prior belief that management value estimates will be biased upward.

Chapter V contains the overall conclusions and implications for the study, as well as a discussion of its limitations and suggestions for future research.

CHAPTER V
CONCLUSIONS

The primary purpose of this chapter is to present the conclusions of the study. The first section reviews the experiment, its objectives, and the results. The second section summarizes the conclusions that can be drawn from the results. Next, the implications of the study are presented. Limitations of the study and suggestions for future research appear in the last two sections.

Summary of the Experiment, Its Objectives, and Results

Subjects were asked to assign credit ratings to a series of hypothetical firms both before and after receiving additional information about the firms. The change in credit ratings was used as a surrogate for the marginal usefulness of the additional information. The subject responses were analyzed across firms to test hypotheses about the way subjects would react to the relevance and reliability of the additional information.

Validating Scheme Firms

Two virtually identical firms that owned vacant land were presented. The additional information was management's estimate of the value of the land, which was assumed to be basically unreliable information. For one of the two companies, the land doubled in value over 10 years and for the other, it doubled in value over 2 years. I expected that the subjects would apply a validating scheme (i.e., comparing the estimated land value with the original cost while considering the length of time the land had been held) to "test" the reliability of the information. It was anticipated that that this process would lead to greater credit rating changes for the 10-year firm over the 2-year firm. This would provide evidence that subjects did, indeed, employ a validating scheme. Subjects were also asked to rate the reliability of the estimated land values.

Contrary to expectation, there was not a significant difference between the two sets of credit rating changes. There was, however, a significant difference between the ratings assigned to the reliability of the land values. Subjects tended to rate the 10-year land value as more reliable than the 2-year land value. Additional questions confirmed that, overall, subjects compared the land values with the original cost and the purchase date. This validating scheme resembles a heuristic known as "adjustment from an anchor."

Decision Environment Firms

Three virtually identical firms were presented, each of which had expended comparable sums of money in developing innovative projects. The additional information for these firms was the value of the projects. In one case, the value was determined by a firm purchase offer, considered to be reliable information. In the other two cases, the value was estimated by management and was considered to be unreliable. These latter two firms were presented in two separate decision contexts along with two other firms in each context. The other firms in one of the contexts had unreliable financial information, while the firms in the other context had reliable information.

Three results were anticipated:

1. Subjects would assign a higher credit rating change to the reliable additional information over the unreliable.
2. Subjects would assign non-zero credit rating changes to the unreliable additional information.
3. Subjects would assign higher credit rating changes in the unreliable context than in the reliable context.

The data supported the first two expectations but not the third. Instead, subjects assigned higher credit rating changes in the reliable environment than in the unreliable environment.

Conclusions

The study was intended to demonstrate that two major classes of variables can affect the willingness of financial statement users to trade off relevance and reliability. These are information-specific variables and environmental variables.

The results of the study demonstrate that bank credit analysts are influenced in their reliability assessments by the ability to test the reliability of seemingly unreliable information. This ability was referred to as a validating scheme and is classified in the study as an information-specific variable. A seemingly unreliable financial disclosure that is capable of being validated will be viewed as more reliable than a disclosure that cannot be validated. The results also point to the use of decision heuristics in the search for, and use of, a validating scheme.

The results of the study also show that credit analysts can be influenced in their tradeoff between relevance and reliability by the overall level of reliability in the decision context. Comparable unreliable disclosures will have more impact in a reliable context than in an unreliable context. In other words, there is a "halo effect" associated with the disclosure in a reliable context. This was classified in the study as an environmental variable. Additionally, the study demonstrates that credit analysts can be influenced by unreliable information but not to the degree of reliable information.

Implications

The results of the study appear to possess three important implications for the FASB's standard-setting process. With respect to the validating scheme results:

1. The difference between the reliability index and credit rating change results suggest that there may be more user consensus in the reliability stage of Figure 2 (page 11) than in the usefulness stage. As such, the tradeoff between relevance and reliability may be more user-specific than was originally thought. This could imply that there can be no simple tradeoff mechanism between relevance and reliability.
2. Users appear to "anchor" on historical cost. This suggests the possibility that even though additional current value disclosures may have some decision usefulness, the removal of the historical cost anchor would cause a very large reduction in decision usefulness. If this is so, it follows that the substitution of current value disclosures for historical cost would cause a net reduction in decision usefulness.

With respect to the decision context hypotheses:

3. The results suggest the possibility of a "halo effect" associated with audited financial statements. Potentially unreliable information had more decision

impact when the overall level of reliability was high than when it was low. This could imply that under some circumstances any information associated with audited financial statements, even that not covered by the auditor's opinion, might be used as though it is higher in reliability than it actually is. The existence of this type of effect could have significant policy implications for the attest function as well as for the standard-setting process.

Limitations

The limitations on the assumptions and methodology of this study are discussed in this section. Bank credit analysts have very little, if any, personal contact with loan applicants. Their assessment of a company's credit worthiness will tend to reflect only the relatively objective financial information available and not consider the personal aspects of a lender-borrower relationship. This latter contact is probably equally important in the lending decision. Certainly, any judgment made by a credit analyst might be tempered by previous bank contact with the borrower. Consequently, it is not possible to project the results of this study directly into an actual borrowing decision without an adequate allowance for other factors affecting the lending decision.

The tasks were constructed to be as realistic as possible within the confines of the research design. The subjects, on the average, indicated that the tasks were "moderately representative" of their work (3.23 on a scale of 1 to 5, where 3 is "moderately representative" and 5 is "very representative"). The extent to which the experiment does not reflect the actual work of a credit analyst is a potential limitation.

Subject motivation is an important issue in any experimental setting. I attempted to emphasize to the subjects their bank's involvement in the study. The experiment was administered during normal working hours, either in a bank conference room or at the subjects' desks. Their immediate supervisor was present at the start of the experiment. With the exception of one unusable response, I detected no other instances in which the subjects appeared to give less than their full effort. In fact, some subjects wanted to know if they could see the final results of the study and others were interested in my discussing the study with their department at a later date. It still remains, however, that motivation in an experimental setting can never duplicate motivation in a work setting. This should be acknowledged as an unavoidable limitation.

One key assumption of the research was the potential for information producer bias. It was assumed that there could exist incentives for the producer of financial statements (manager) to bias the reported information[1] in such a way as to maximize his own utility. This assumption was especially critical in the justification for the use of hardness as a way to manipulate reliability. The research described here is only valid to the extent that such a potential for producer bias actually exists in the real world.

The experiment did not include the possibility of negative producer bias such as one might expect periodically if the manager were involved in income smoothing. Financial statement users probably expect managers to bias information positively rather than negatively, at least in the absence of income tax considerations. This expectation of positive bias was confirmed in the study. So, the opportunity for negative producer bias would considerably complicate the experimental setting.

Suggested Future Research

A starting point for future research is further examination of the three implications for the standard-setting process previously mentioned. In connection with this, replication of the results of this study seem to be especially appropriate. Other future research in the tradeoff between relevance and reliability could center on the extent to which the tradeoff is determined by the differing uses of the financial information, which implies a "type of user" effect. For instance, do bankers exhibit a tradeoff function different from investors? Alternatively, one could search for additional variables that could influence the tradeoff function. Another route might look at the side of the tradeoff function not considered in the study: the deletion of a disclosure. A particularly ambitious approach would be the actual graphical plotting of tradeoff functions. This would seem to require the development of interval scale measures of relevance and reliability.

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[1] The manager's actions were limited in this study to biasing the reporting of economic events. The actions do not include making real, economic decisions to bolster reported information.

Another interesting path for future research is an examination of the extent to which FASB pronouncements reflect an implied goal of systematically making financial statements harder. If this is true, then it seems to reflect an increased, but unstated, concern with the control of potential information producer bias; a concern that may not have been evident in the FASB's predecessors.[2] It may also imply a revealed preference on the part of the Board for reliability at the possible expense of relevance. If this is true, then we could question the extent to which the Board's preference for reliability reflects the users' preference.

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[2] This concern is being voiced frequently by accounting researchers. For example, Barlev [1983] shows that the treasury stock method of adjusting for dilutive securities in calculating earnings per share is highly susceptible to management manipulation.

SFAC No. 2 is a relatively untapped source for empirical research. For instance, the FASB emphasized in SFAC No. 2 that the standard-setting process will continually involve tradeoffs between the qualitative characteristics of financial accounting information. One such tradeoff was examined in this study. Other potential tradeoffs include relevance and understandability, and relevance and comparability. Empirical research could begin to examine the nature of these tradeoffs. Since the FASB intends to use the results of the conceptual framework project in future standard-setting, parallel empirical research into the findings of the conceptual framework is critical.

APPENDIX
EXPERIMENTAL INSTRUMENT

For Order Code A

GENERAL INFORMATION

This study is designed to learn more about how bank credit analysts use accounting information to assess the credit worthiness of companies seeking loans.

There are five (5) sets of information contained inside for your review. You should look at each set as being self contained. You will be asked to assign credit ratings to companies seeking bank loans. The credit rating procedure is described on the following page.

In each of the five sets, you will be asked to assign a credit rating to the company or companies in the set based on financial information about the company or companies. You will then be asked to assign another credit rating to the same company or companies after receiving additional information. Once you have assigned a credit rating, do not go back and change it after receiving the additional information. Instead, assign a new credit rating which may or may not differ from your original rating. Also, do not "anticipate" the additional information when assigning the original credit rating.

After you complete all of the assignments in a given set, proceed to the next set. Please do not refer back to any previous sets.

In assigning the credit ratings, please keep the following in mind:

1. Use your professional judgment in assessing the companies' credit worthiness. Try to avoid relying on your bank's established credit policies and practices.

2. Rely only on the information provided to you about the companies. There will probably be cases when you would like to have more information, but assume that it is just not available.

3. Remember that you are evaluating the firms on a ten-point scale of credit worthiness. You are not making a "yes" or "no" decision on whether the loan should be approved.

In addition, there are other questions interspersed throughout the study. Please answer them to the best of your ability.

This study is not an examination of your progress in the bank's training program. Your responses will be grouped with the responses of all other participants including those from other banks to arrive at generalizations about the use of accounting information by credit analysts.

You have my assurance that your individual responses will be held in strict confidence.

EXPLANATION OF CREDIT RATING IS ON THE NEXT PAGE

CREDIT RATING SYSTEM

Assume that your bank has established a system of assigning credit ratings to firms requesting loans. When a loan application is received, a review of the information available in comparison to the size and type of the loan requested is made. A credit rating is assigned that reflects your assessment of the risk that the loan will become a problem loan at some time during its term. The credit rating will be a number from 1 to 10 using the scale below as a guide:

----------*-----*-----*-----*-----*-----*-----*-----*
1 2 3 4 5 6 7 8 9 10

very risky: will probably become a problem loan.	moderately risky: some chance of becoming a problem loan.	almost risk free: practically no chance of becoming a problem loan.

SET 1 page 1

Review the following information and assign a credit rating in the box at the bottom of the page.

Company Boatright Consulting Inc., founded in 1976. Company specializes in assisting municipalities in determining future water and sewer needs and providing feasibility studies for waste treatment planta.

Loan Requested $100,000 unsecured loan, due at the end of 4 years, to market innovative design projects.

Financial Information (CPA issued a clean opinion on statements.)

Balance Sheet

Assets	1983	1982
Cash	$ 15,114	$ 18,962
Fees receivable	76,003	68,144
Unbilled studies in process	143,152	106,678
Total current	234,269	193,784
Land, Bldg. & equipment	185,319	196,412
Total Assets	$419,588	$390,196
Liabilities & Equity		
Accounta payable	$163,360	89,916
Total current	163,360	89,916
Long term debt - land & bldg.	136,767	144,317
Total Liabilities	300,127	234,233
Common stock	50,000	50,000
Retained earnings	69,461	105,963
Total Equity	119,461	155,963
Total Liabilities & Equity	$419,588	$390,196

Income Statement

	1983	1982
Revenuea	$349,000	$265,000
Expenses:		
Direct cost of client studies	151,466	112,184
Office salaries	39,213	37,898
Depreciation	31,186	29,236
Interest	16,412	17,318
Design projects developed for co. use*	93,082	79,314
Other expenses	57,195	41,829
Total Expenses	388,554	317,779
Pretax Loss	(39,554)	(52,779)
Income tax refund	3,052	13,889
Net loss	(36,502)	(38,890)
Dividends	0	0

Note: * The company developed a series of innovative designs for use in waste treatment plants during 1982 and 1983. The cost of these designs was shown as a expense in the income statement in accordance with accounting rules.

CREDIT RATING

----------*-----*-----*-----*-----*-----*-----*-----* → ☐

1 2 3 4 5 6 7 8 9 10

very risky: will probably become a problem loan.	moderately risky: some chance of becoming a problem loan.	almost risk free: practically no chance of becoming a problem loan.

SET 1 page 2

Additional information is now available. Reassign a credit rating in the box at the bottom of the page.

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Financial Information (CPA issued a clean opinion on statements.)

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Income tax refund	3,052	13,889
Net loss	(36,502)	(38,890)
Dividends	0	0

Note: * The company developed a series of innovative designs for use in waste treatment plants during 1982 and 1983. The cost of these designs was shown as a expense in the income statement in accordance with accounting rules.

ADDITIONAL INFORMATION: A large competitor offered to buy the design projects from Boatright for $225,000 in cash plus guaranteed royalty payments of $75,000 per year for five years. A bank officer has reviewed the papers in connection with the offer. Boatright declined the offer and has decided to market the designs itself.

CREDIT RATING

----------*-----*-----*-----*-----*-----*-----*-----* → ☐

1 2 3 4 5 6 7 8 9 10

very risky: will probably become a problem loan.	moderately risky: some chance of becoming a problem loan.	almost risk free: practically no chance of becoming a problem loan.

SET 2

Review the following information and assign a credit rating in the box at the bottom of the page.

Company Colmer Supply Co., started in 1968, is a wholesaler of industrial valves and fittings.

Loan Requested: $250,000 unsecured loan to be repaid at the end of 3 years. Will be used for working capital purposes. Colmer has agreed to give the bank a "negative pledge" on the vacant land (see balance sheet): Colmer promises not to further encumber the land until the loan is repaid. These terms are acceptable to the bank in principle subject to the credit review.

Financial Information (CPA issued a clean opinion on statements)

Balance Sheet

	1983	1982
Assets		
Cash	$ 12,688	$ 18,972
Accts. receiv.	126,333	109,663
Inventory	182,056	163,010
Total current	321,077	291,645
Plant & equip.	424,913	430,712
Land (vacant) at cost	340,000	340,000
Total Assets	1,085,990	1,062,357
Liabilities & Capital		
Accounts payable	$131,884	$106,255
Note payable for inventory	105,000	100,000
Current mortgage	50,857	50,857
Total current	287,741	257,112
Mortgage payable	305,143	356,000
Note payable - secured by land	120,000	120,000
Total Liabilities	712,684	733,112
Common Stock	175,000	145,000
Retained Earnings	198,106	184,245
Total Capital	373,106	329,245
Total Liabilities & Capital	1,085,990	1,062,357

Income Statement

	1983	1982
Sales	$884,330	$868,212
Cost of sales	504,068	477,520
Gross profit	330,262	390,692
Expenses:		
Depreciation	83,118	82,005
Interest	70,120	76,223
Other expense	200,129	173,774
Total expenses	353,367	332,002
Pretax income	26,895	58,690
Income tax	4,034	12,912
Net income	$ 22,861	$ 46,043
Dividends paid	$ 9,000	$ 12,000

CREDIT RATING

----------*-----*-----*-----*-----*-----*-----*-----* → ☐

1 2 3 4 5 6 7 8 9 10

very risky: will probably become a problem loan.	moderately risky: some chance of becoming a problem loan.	almost risk free: practically no chance of becoming a problem loan.

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Financial Information (CPA issued a clean opinion on statements)

Balance Sheet

	1983	1982
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Pretax Income	26,895	58,690
Income tax	4,034	12,912
Net income	$ 22,861	$ 46,043
Dividends paid	$ 9,000	$ 12,000

ADDITIONAL INFORMATION: The land shown on the balance sheet was purchased in 1973 at a cost of $340,000. The land is located in a stable industrial area. Although a formal appraisal of the land has not been made recently, management claims that the land is readily marketable and worth about $750,000.

CREDIT RATING

----------*-----*-----*-----*-----*-----*-----*-----* → ☐

1 2 3 4 5 6 7 8 9 10

very risky: will probably become a problem loan.	moderately risky: some chance of becoming a problem loan.	almost risk free: practically no chance of becoming a problem loan.

In the space provided:

(1) Please write a short explanation of how you used the additional information (land value) on page 2 in reassessing the credit rating of the firm.

(2) Did management's estimate of the land value seem reasonable to you in light of the available facts? Did you feel that you could depend on it? Why or why not?

(3) Evaluate the dependability (reliability) of the additional information provided by the company. Circle your answer.

1----------2----------3----------4----------5----------6----------7

very undependable	moderately dependable	very dependable

SET 3

INSTRUCTIONS:
There are three (3) companies in this set. Assume that you have been informed by your bank that there are limited funds available for loans. The three firms will be ranked according to the credit ratings assigned.

Review the following information on pages 1, 2, and 3, and assign credit ratings on page 4.

Here is the first company of the three.

Company Luminall, Inc. was formed in 1965 to market a variety of janitorial supplies to local businesses.

Loan Requested $220,000 unsecured loan to be repaid in 48 months. Will be used for general operating purposes and expansion.

Financial Information (Company's CPA only does tax and very limited review work.)

The company has not provided formal financial statements. The company's treasurer furnished the following:

"Cash balances averaged $80,000 during the last two years. Receivables were approximately $248,000 in 1982 and $260,000 in 1983. The company maintains a large inventory; it runs about $600,000 on the average. The company rents its facilities, paying about $3,000 a month in rent.

"Debts total about $500,000 at the end of the 1983 year, up by about $40,000 over the year before. The company had sales of $780,000 and $910,000 in 1982 and 1983. After-tax profits were $135,000 and $150,000 in 1982 and 1983."

Here is the second firm in this set.

Company Tinker & Associates, formed in 1974 to provide detailed plans for companies automating their materials handling requirements.

Loan Requested $250,000 unsecured loan to be repaid at the end of 50 months. To be used for expansion and marketing purposes.

Financial Information (CPA issued a clean opinion on statements.)

Balance Sheet

Assets	1983	1982
Cash	$ 36,274	$ 45,509
Accts. receivable	182,407	163,546
Work in progress	343,565	256,027
Total current	562,246	465,082
Plant & equipment	440,183	471,389
Total Assets	$1,002,429	$ 936,471
Liabilities & Equity		
Accounts payable	$ 385,027	213,298
Total current	385,027	213,298
Mortgage payable	328,246	346,361
Total Liabilities	713,273	559,659
Common stock	117,500	117,500
Retained income	171,656	259,312
Total equity	289,156	376,812
Total Liabilities & Equity	$1,002,429	$ 936,471

Income Statement

	1983	1982
Revenues	$837,600	$636,000
Cost of Sales*	363,518	269,242
Gross profit	474,082	366,758
Expenses:		
Salaries	94,111	90,955
Depreciation	74,846	70,166
Interest	39,389	41,563
Research & Development**	223,397	190,354
Other	137,268	100,390
Total expenses	569,011	493,428
Pretax Loss	(94,929)	(126,670)
Income tax refund	7,273	33,334
Net Loss	(87,656)	(93,336)
Dividends paid	0	0

Notes: * Cost of Sales represents the direct costs charged to client jobs plus applicable overhead.

** Research & Development expenses related to new specialized techniques developed to streamline implementation of automated materials handling systems. They have been charged against income in accordance with Statement No. 2 of the Financial Accounting Standards Board.

Here is the third firm in this set.

Company Moustafa & Co., incorporated in 1980. Operates a chain of 5 sandwich shops.

Loan Requested $235,000 unsecured loan to be repaid in 36 months. To be used for operating purposes and expansion.

Financial Information (The company has never engaged a CPA to audit its statements.)

Balance Sheet

	1983	1982
Cash	$ 89,000	$ 23,000
Food inventory	253,500	198,000
Total current	342,500	221,000
Value of rentals*	65,000	60,000
Goodwill**	55,000	45,000
Total assets	$462,500	$326,000
Bills owed to suppliers	18,000	12,000
Total Liabilities	18,000	12,000
Owner's investment	300,000	249,125
Net profits	144,500	64,875
Total Capital		
Total Liabilities & Capital	$462,500	$326,000

Income Statement

	1983	1982
Sales	$569,693	$278,600
Total Expenses	484,322	301,838
Net Profits or (Losses)	$ 85,371	$(23,238)

Notes: * The owner feels that he negotiated store rentals on favorable terms below market prices. These amounts are the difference between assumed market rates and actual rental payments over the remaining terms of the leases.

** The owner has many years experience in the food industry. He feels that this experience is goodwill for the company.

SET 3

Assign credit ratings in the boxes below.
Please do not go beyond this page until all three boxes have been filled in.

LUMINALL, INC.

----------*-----*-----*-----*-----*-----*-----*-----* → ☐

1 2 3 4 5 6 7 8 9 10

very risky: will probably become a problem loan.	moderately risky: some chance of becoming a problem loan.	almost risk free: practically no chance of becoming a problem loan.

TINKER & ASSOCIATES

----------*-----*-----*-----*-----*-----*-----*-----* → ☐

1 2 3 4 5 6 7 8 9 10

very risky: will probably become a problem loan.	moderately risky: some chance of becoming a problem loan.	almost risk free: practically no chance of becoming a problem loan.

MOUSTAFA & CO.

----------*-----*-----*-----*-----*-----*-----*-----* → ☐

1 2 3 4 5 6 7 8 9 10

very risky: will probably become a problem loan.	moderately risky: some chance of becoming a problem loan.	almost risk free: practically no chance of becoming a problem loan.

INSTRUCTIONS:
Additional information for the three companies is now available. Review the following information on pages 5, 6, and 7, and reassign credit ratings on page 8.

Here is the first company in this set; now includes additional information.

Company Luminall, Inc. was formed in 1965 to market a variety of janitorial supplies to local businesses.

Loan Requested $220,000 unsecured loan to be repaid in 48 months. Will be used for general operating purposes and expansion.

Financial Information (Company's CPA only does tax and very limited review work.)

The company has not provided formal financial statements. The company's treasurer furnished the following:

"Cash balances averaged $80,000 during the last two years. Receivables were approximately $248,000 in 1982 and $260,000 in 1983. The company maintains a large inventory; it runs about $600,000 on the average. The company rents its facilities, paying about $3,000 a month in rent.

"Debts total about $500,000 at the end of the 1983 year, up by about $40,000 over the year before. The company had sales of $780,000 and $910,000 in 1982 and 1983. After-tax profits were $135,000 and $150,000 in 1982 and 1983."

ADDITIONAL INFORMATION: The company has an exclusive contract to sell a top brand of industrial degreasers. Although the contract is only contributing a nominal amount to sales presently, the treasurer feels that the contract is probably worth about $375,000 to the company on a present value basis.

Here is the second company in this set; now includes additional information.

Company Tinker & Associates, formed in 1974 to provide detailed plans for companies automating their materials handling requirements.

Loan Requested $250,000 unsecured loan to be repaid at the end of 50 months. To be used for expansion and marketing purposes.

Financial Information (CPA issued a clean opinion on statements.)

Balance Sheet

Assets	1983	1982
Cash	$ 36,274	$ 45,509
Accts. receivable	182,407	163,546
Work in progress	343,565	256,027
Total current	562,246	465,082
Plant & equipment	440,183	471,389
Total Assets	$1,002,429	$ 936,471
Liabilities & Equity		
Accounts payable	$ 385,027	213,298
Total current	385,027	213,298
Mortgage payable	328,246	346,361
Total Liabilities	713,273	559,659
Common stock	117,500	117,500
Retained income	171,656	259,312
Total equity	289,156	376,812
Total Liabilities & Equity	$1,002,429	$ 936,471

Income Statement

	1983	1982
Revenues	$837,600	$636,000
Cost of Sales*	363,518	269,242
Gross profit	474,082	366,758
Expenses:		
Salaries	94,111	90,955
Depreciation	74,846	70,166
Interest	39,389	41,563
Research & Development**	223,397	190,354
Other	137,268	100,390
Total expenses	569,011	493,428
Pretax Loss	(94,929)	(126,670)
Income tax refund	7,273	33,334
Net Loss	(87,656)	(93,336)
Dividends paid	0	0

Notes: * Cost of Sales represents the direct costs charged to client jobs plus applicable overhead.

** Research & Development expenses related to new specialized techniques developed to streamline implementation of automated materials handling systems. They have been charged against income in accordance with Statement No. 2 of the Financial Accounting Standards Board.

ADDITIONAL INFORMATION: It is believed by management that the research & development shown in the statements is worth $550,000 in cash plus an additional $180,000 per year in royalty payments. Management thinks there is a ready market for the R&D.

Here is the third company in this set; now includes additional information.

Company Moustafa & Co., incorporated in 1980. Operates a chain of 5 sandwich shops.

Loan Requested $235,000 unsecured loan to be repaid in 36 months. To be used for operating purposes and expansion.

Financial Information (The company has never engaged a CPA to audit its statements.)

Balance Sheet

	1983	1982
Cash	$ 89,000	$ 23,000
Food inventory	253,500	198,000
Total current	342,500	221,000
Value of rentals*	65,000	60,000
Goodwill**	55,000	45,000
Total assets	$462,500	$326,000
Bills owed to suppliers	18,000	12,000
Total Liabilities	18,000	12,000
Owner's investment	300,000	249,125
Net profits	144,500	64,875
Total Capital		
Total Liabilities & Capital	$462,500	$326,000

Income Statement

	1983	1982
Sales	$569,693	$278,600
Total Expenses	484,322	301,838
Net Profits or (Losses)	$ 85,371	$(23,238)

Notes: * The owner feels that he negotiated store rentals on favorable terms below market prices. These amounts are the difference between assumed market rates and actual rental payments over the remaining terms of the leases.

** The owner has many years experience in the food industry. He feels that this experience is goodwill for the company.

ADDITIONAL INFORMATION: The company has just opened 3 new stores in prime shopping areas. The owner feels that these new stores will generate $275,000 per year in extra sales.

SET 3

Reassign credit ratings in the boxes below.

LUMINALL, INC.

----------*-----*-----*-----*-----*-----*-----*-----* → ☐

1 2 3 4 5 6 7 8 9 10

very risky: will probably become a problem loan.	moderately risky: some chance of becoming a problem loan.	almost risk free: practically no chance of becoming a problem loan.

TINKER & ASSOCIATES

----------*-----*-----*-----*-----*-----*-----*-----* → ☐

1 2 3 4 5 6 7 8 9 10

very risky: will probably become a problem loan.	moderately risky: some chance of becoming a problem loan.	almost risk free: practically no chance of becoming a problem loan.

MOUSTAFA & CO.

----------*-----*-----*-----*-----*-----*-----*-----* → ☐

1 2 3 4 5 6 7 8 9 10

very risky: will probably become a problem loan.	moderately risky: some chance of becoming a problem loan.	almost risk free: practically no chance of becoming a problem loan.

How would you assess the overall dependability (reliability) of the financial information provided in this set? (circle one)

* undependable   * dependable

Evaluate the dependability (reliability) of the information provided by each of the companies in this set. Circle your answer.

LUMINALL, INC.

Basic Information

1----------2----------3----------4----------5----------6----------7

very undependable	moderately dependable	very dependable

Additional Information

1----------2----------3----------4----------5----------6----------7

very undependable	moderately dependable	very dependable

TINKER & ASSOCIATES

Basic Information

1----------2----------3----------4----------5----------6----------7

very undependable	moderately dependable	very dependable

Additional Information

1----------2----------3----------4----------5----------6----------7

very undependable	moderately dependable	very dependable

MOUSTAFA & CO.

Basic Information

1----------2----------3----------4----------5----------6----------7

very undependable	moderately dependable	very dependable

Additional Information

1----------2----------3----------4----------5----------6----------7

very undependable	moderately dependable	very dependable

SET 4

Review the following information and assign a credit rating in the box at the bottom of the page.

Company Young Wholesale Inc. Founded in 1965. Distributes a full line of air compressors, hoses, and couplings.

Loan Requested: $180,000 to be repaid at the end of 40 months. Loan to be unsecured and used for general operating purposes and growth. The bank has agreed to accept a "negative pledge" on the vacant land (balance sheet) if the loan is approved. (i.e., Young cannot encumber the land further.)

Financial Information (CPA issued a clean opinion on statements.)

Balance Sheet

Assets	1983	1982
Cash	$ 9,135	$13,660
Receivables	90,960	78,957
Inventory	131,080	117,367
Total current	231,175	209,984
Property & equip.	305,937	310,113
Vacant land at cost	244,800	244,800
Total Assets	$781,912	764,897
Liabilities & Stockholder Equity		
Accounts payable	$ 94,983	$79,503
Note to manufacturer for inventory	75,600	72,000
Current mortgage	33,726	33,726
Total current	204,309	185,229
Long term mortgage	222,594	256,320
Long term note - land pledged as collateral	86,400	86,400
Total Liabilities	513,303	527,949
Common Stock	125,600	104,000
Retained Earnings	143,009	132,948
Total Equity	268,609	236,948
Total Liabilities & Equity	$781,912	764,897

Earnings Statement

	1983	1982
Sales	$636,718	$625,113
Cost of goods sold	362,929	343,814
Gross margin	273,789	281,299
Expenses:		
Salaries	73,098	70,583
Depreciation	59,845	59,044
Interest	50,486	54,881
Other	70,995	54,533
Total expenses	254,424	239,041
Income before tax	19,365	42,258
Income tax	2,804	9,297
Net income	$ 16,561	$ 32,961
Dividends	$ 6,500	$ 8,600

CREDIT RATING

----------*-----*-----*-----*-----*-----*-----*-----* → ☐

1 2 3 4 5 6 7 8 9 10

very risky: will probably become a problem loan.	moderately risky: some chance of becoming a problem loan.	almost risk free: practically no chance of becoming a problem loan.

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Total Assets	$781,912	764,897
Liabilities & Stockholder Equity		
Accounts payable	$ 94,983	$79,503
Note to manufacturer for inventory	75,600	72,000
Current mortgage	33,726	33,726
Total current	204,309	185,229
Long term mortgage	222,594	256,320
Long term note - land pledged as collateral	86,400	86,400
Total Liabilities	513,303	527,949
Common Stock	125,600	104,000
Retained Earnings	143,009	132,948
Total Equity	268,609	236,948
Total Liabilities & Equity	$781,912	764,897

Earnings Statement

	1983	1982
Sales	$636,718	$625,113
Cost of goods sold	362,929	343,814
Gross margin	273,789	281,299
Expenses:		
Salaries	73,098	70,583
Depreciation	59,845	59,044
Interest	50,486	54,881
Other	70,995	54,533
Total expenses	254,424	239,041
Income before tax	19,365	42,258
Income tax	2,804	9,297
Net income	$ 16,561	$ 32,961
Dividends	$ 6,500	$ 8,600

ADDITIONAL INFORMATION: The company purchased the vacant land in 1981 for $244,800. It is located in a steady commercial area. Management estimates that the land is worth about $525,000 at the present and should sell quickly at that price. An appraisal has not been made.

CREDIT RATING

`*-----*-----*-----*-----*-----*-----*-----*-----*-----* →` ☐

1 2 3 4 5 6 7 8 9 10

very risky: will probably become a problem loan.	moderately risky: some chance of becoming a problem loan.	almost risk free: practically no chance of becoming a problem loan.

In the space provided:

(1) Please write a short explanation of how you used the additional information (land value) on page 2 in reassessing the credit rating of the firm.

(2) Did management's estimate of the land value seem reasonable to you in light of the available facts? Did you feel that you could depend on it? Why or why not?

(3) Evaluate the dependability (reliability) of the additional information provided by the company. Circle your answer.

1----------2----------3----------4----------5----------6----------7

very undependable	moderately dependable	very dependable

SET 5

INSTRUCTIONS:
There are three (3) companies in this set. Assume that you have been informed by your bank that there are limited funds available for loans. The three firms will be ranked according to the credit ratings assigned.

Review the following information on pages 1, 2, and 3, and assign credit ratings on page 4.

Here is the first company of the three.

Company Security Services Inc. was formed in 1965. Provides security guards and watchmen for local businesses.

Loan Requested $350,000 unsecured loan to be repaid at the end of 5 years. To finance expansion to a neighboring community.

Financial Information (CPA issued a clean opinion on statements.)

Balance Sheet

Assets	1983	1982
Cash	$ 128,046	$ 64,871
Receivables	413,707	395,966
Total current	541,753	460,837
Land, Bldg. & Equipment	1,201,281	1,046,472
Total Assets	$1,743,034	1,507,309
Liabilities & Equity		
Accounts payable	51,954	46,165
Total current	51,954	46,165
Notes payable, equipment	35,000	52,500
Mortgage payable	595,368	500,429
Total Liabilities	682,322	599,094
Common Stock	175,000	175,000
Retained Earnings	885,712	733,215
Total Equity	1,060,712	908,215
Total Liabilities & Equity	$1,743,034	1,507,309

Income Statement

	1983	1982
Revenues	$1,445,150	$1,262,279
Expenses:		
Guard Wages	562,419	491,152
Depreciation	164,500	150,367
Interest	75,649	60,463
Other	192,546	172,557
Total expenses	995,114	874,539
Pretax income	450,036	387,740
Income tax	157,539	131,832
Net Income	$292,497	$255,908
Dividends paid	$140,000	$105,000

SET 5

Here is the second company in this set.

Company Glenn Cable TV Contractors, founded in 1981. Installs cable for cable TV franchises in a six-county area.

Loan Requested $375,000 unsecured loan to be repaid at the end of 36 months for working capital purposes and to finance expansion.

Financial Information (CPA issued a clean opinion on statements.)

Balance Sheet

Assets	1983	1982
Cash	$ 51,240	$ 5,125
Accts. receivable	223,257	135,965
Inventory	32,793	26,305
Total current	307,290	167,395
Equipment	273,640	276,063
Total Assets	$580,930	$443,458
Liabilities & Equity		
Accounts payable	14,780	12,245
Total current	14,780	12,245
Notes payable, equipment	203,442	205,099
Total Liabilities	218,222	217,344
Common Stock	350,320	350,320
Retained Income	12,388	(124,206)
Total Equity	362,708	226,114
Total Liabilities & Equity	$580,930	$443,458

Income Statement

	1983	1982
Revenue	$911,508	$445,760
Expenses:		
Cable Installation		
Direct labor	328,143	159,930
Direct materials	118,495	67,660
Overhead	121,078	99,973
Subtotal	567,716	327,563
Operating		
Salaries	114,168	94,408
Other	93,030	60,970
Subtotal	207,198	155,378
Total Expenses	774,914	482,941
Pretax Income	136,594	(37,181)
Income Tax	0	0
Net Income	$136,594	$(37,181)
Dividends	0	0

Here is the third company in this set.

Company Jones, Kline & Co. The company was organized in 1972 to provide engineering services to the chemical manufacturing industry.

Loan Requested $400,000 unsecured loan due at the end of 5 years. For general working capital purposes and expansion.

Financial Information (CPA issued a clean opinion on statements.)

Balance Sheet

Assets	1983	1982
Cash	$ 58,038	$ 72,814
Client receiv.	291,851	261,674
Client projects in process	549,704	409,643
Total current	899,593	744,131
Land, buildings & equipment	708,292	754,222
Total Assets	$1,607,885	1,498,353
Liabilities & Equity		
Accounts payable	628,589	340,777
Total current	628,589	340,777
Note payable, property	525,186	554,178
Total Liabilities	1,153,775	894,955
Common stock	187,500	187,500
Retained earnings	266,610	415,898
Total Equity	454,110	603,398
Total Liabilities & Equity	$1,607,885	1,498,353

Income Statement

	1983	1982
Fees	1,340,160	1,017,600
Expenses:		
Client projects	581,629	430,787
Depreciation	119,754	112,266
Interest	63,022	66,501
Patent expense*	372,328	317,256
Other expenses	370,206	306,152
Total Expenses	1,506,939	1,232,962
Pretax Loss	(166,779)	(215,362)
Income tax refund	17,491	53,150
Net Loss	(149,288)	(162,212)
Dividends paid	0	0

Note: *Patents covering improved quality control techniques for chemical manufacturing were developed in 1982 and 1983. The costs appear as "Patent Expense" on the income statement.

SET 5

Assign credit ratings in the boxes below.
Please do not go beyond this page until all three boxes have been filled in.

SECURITY SERVICES INC.

----------*-----*-----*-----*-----*-----*-----*-----* → ☐

1 2 3 4 5 6 7 8 9 10

very risky: will probably become a problem loan.	moderately risky: some chance of becoming a problem loan.	almost risk free: practically no chance of becoming a problem loan.

GLENN CABLE TV CONTRACTORS

----------*-----*-----*-----*-----*-----*-----*-----* → ☐

1 2 3 4 5 6 7 8 9 10

very risky: will probably become a problem loan.	moderately risky: some chance of becoming a problem loan.	almost risk free. practically no chance of becoming a problem loan.

JONES, KLINE & CO.

----------*-----*-----*-----*-----*-----*-----*-----* → ☐

1 2 3 4 5 6 7 8 9 10

very risky: will probably become a problem loan.	moderately risky: some chance of becoming a problem loan.	almost risk free: practically no chance of becoming a problem loan.

INSTRUCTIONS:
Additional information for the three companies is now available. Review the following information on pages 5, 6, and 7, and reassign credit ratings on page 8.

Here is the first company in this set; now includes additional information.

Company Security Services Inc. was formed in 1965. Provides security guards and watchmen for local businesses.

Loan Requested $350,000 unsecured loan to be repaid at the end of 5 years. To finance expansion to a neighboring community.

Financial Information (CPA issued a clean opinion on statements.)

Balance Sheet

Assets	1983	1982
Cash	$ 128,046	$ 64,871
Receivables	413,707	395,966
Total current	541,753	460,837
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Total Liabilities	682,322	599,094
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Retained Earnings	885,712	733,215
Total Equity	1,060,712	908,215
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Income Statement

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Expenses:		
Guard Wages	562,419	491,152
Depreciation	164,500	150,367
Interest	75,649	60,463
Other	192,546	172,557
Total expenses	995,114	874,539
Pretax income	450,036	387,740
Income tax	157,539	131,832
Net Income	$292,497	$255,908
Dividends paid	$140,000	$105,000

ADDITIONAL INFORMATION: The company has just signed contracts with 5 businesses to provide security services in a neighboring community. The contracts are for one year and will generate a total of $800,000 in additional revenue.

SET 5

Here is the second company in this set; now includes additional information.

Company Glenn Cable TV Contractors, founded in 1981. Installs cable for cable TV franchises in a six-county area.

Loan Requested $375,000 unsecured loan to be repaid at the end of 36 months for working capital purposes and to finance expansion.

Financial Information (CPA issued a clean opinion on statements.)

Balance Sheet

Assets	1983	1982
Cash	$ 51,240	$ 5,125
Accts. receivable	223,257	135,965
Inventory	32,793	26,305
Total current	307,290	167,395
Equipment	273,640	276,063
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Common Stock	350,320	350,320
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Total Equity	362,708	226,114
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Revenue	$911,508	$445,760
Expenses:		
Cable Installation		
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Direct materials	118,495	67,660
Overhead	121,078	99,973
Subtotal	567,716	327,563
Operating		
Salaries	114,168	94,408
Other	93,030	60,970
Subtotal	207,198	155,378
Total Expenses	774,914	482,941
Pretax Income	136,594	(37,181)
Income Tax	0	0
Net Income	$136,594	$(37,181)
Dividends	0	0

ADDITIONAL INFORMATION: The company has just signed contracts with 7 more cable franchises. Estimated billings from these contracts is $775,000 over two years.

Here is the third company in the set; now includes additional information.

Company Jones, Kline & Co. The company was organized in 1972 to provide engineering services to the chemical manufacturing industry.

Loan Requested $400,000 unsecured loan due at the end of 5 years. For general working capital purposes and expansion.

Financial Information (CPA issued a clean opinion on statements.)

Balance Sheet

Assets	1983	1982
Cash	$ 58,038	$ 72,814
Client receiv.	291,851	261,674
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Note payable, property	525,186	554,178
Total Liabilities	1,153,775	894,955
Common stock	187,500	187,500
Retained earnings	266,610	415,898
Total Equity	454,110	603,398
Total Liabilities & Equity	$1,607,885	1,498,353

Income Statement

	1983	1982
Fees	1,340.160	1,017,600
Expenses:		
Client projects	581,629	430,787
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Pretax Loss	(166,779)	(215,362)
Income tax refund	17,491	53,150
Net Loss	(149,288)	(162,212)
Dividends paid	0	0

Note: *Patents covering improved quality control techniques for chemical manufacturing were developed in 1982 and 1983. The costs appear as "Patent Expense" on the income statement.

ADDITIONAL INFORMATION: Management estimates that the patents are probably worth a cash price of $875,000 plus royalty payments of $300,000 per year. Management believes that the patents are readily marketable.

SET 5

Reassign credit ratings in the boxes below.

SECURITY SERVICES INC.

----------*-----*-----*-----*-----*-----*-----*-----* → ☐

1 2 3 4 5 6 7 8 9 10

very risky: will probably become a problem loan.	moderately risky: some chance of becoming a problem loan.	almost risk free practically no chance of becoming a problem loan.

GLENN CABLE TV CONTRACTORS

----------*-----*-----*-----*-----*-----*-----*-----* → ☐

1 2 3 4 5 6 7 8 9 10

very risky: will probably become a problem loan.	moderately risky: some chance of becoming a problem loan.	almost risk free: practically no chance of becoming a problem loan.

JONES, KLINE & CO.

----------*-----*-----*-----*-----*-----*-----*-----* → ☐

1 2 3 4 5 6 7 8 9 10

very risky: will probably become a problem loan.	moderately risky: some chance of becoming a problem loan.	almost risk free: practically no chance of becoming a problem loan.

How would you assess the overall dependability (reliability) of the financial information provided in this set? (circle one)

* undependable

* dependable

Evaluate the dependability (reliability) of the information provided by each of the companies in this set. Circle your answer.

SECURITY SERVICES INC.

Basic Information

1----------2----------3----------4----------5----------6----------7

very undependable | moderately dependable | very dependable

Additional Information

1----------2----------3----------4----------5----------6----------7

very undependable | moderately dependable | very dependable

GLENN CABLE TV CONTRACTORS

Basic Information

1----------2----------3----------4----------5----------6----------7

very undependable | moderately dependable | very dependable

Additional Information

1----------2----------3----------4----------5----------6----------7

very undependable | moderately dependable | very dependable

JONES, KLINE & CO.

Basic Information

1----------2----------3----------4----------5----------6----------7

very undependable | moderately dependable | very dependable

Additional Information

1----------2----------3----------4----------5----------6----------7

very undependable | moderately dependable | very dependable

ADDITIONAL QUESTIONS

In questions 1 through 3, assume a situation in which you have no previous knowledge of the management in question.

1. Consider an estimate of an asset value (e.g., real estate) made by management to be used in a credit review situation.
    a. How would you assess the likelihood that this estimate made by management is greater than an estimate of the same asset's value that would be made by a third party, such as an appraiser? Circle your answer.

1---------------2---------------3---------------4---------------5

not likely to be greater than 3rd party estimate	somewhat likely to be greater than 3rd party estimate	very likely to be greater than 3rd party estimate

b. Assume that the estimate of the asset's value made by management is greater than an estimate of the same asset's value made by a third party. Assume also that there are two possible causes of this condition: (1) management's possible lack of expertise in making estimates of this type, and (2) management's possible inclination to bias the estimate upward. Which of the following best describes your assessment of the reason that management's estimate is greater than the third party estimate?

1--------------------2--------------------3--------------------4

lack of expertise by management	more a lack of expertise by mgt. than bias	more mgt. bias than lack of expertise	management bias

2. In general, how important is the dependability (reliability) of financial information supplied by a company's management to the assessment of credit worthiness?

1----------2----------3----------4----------5----------6----------7

not important	somewhat important	very important

3. In general, do you tend to feel that management estimates of asset values (e.g., real estate) are probably biased upward?

*	*
no	yes

ADDITIONAL QUESTIONS

4. In Set 2, you were given management's estimate of the value of vacant land owned by the company. You may have considered whether management's value seemed reasonable under the circumstances. Select the factors that determined your reaction, if any, to the reasonableness of the land value by placing a check mark in the first column. Then, in the next column, rank only the items that you chose in column 1 in order of importance. (Rank of 1 = most important)

Possible Factors	Was the factor used? (check mark)	Rank of importance of checked items (1 = most important)
Description of land	______	______
Comparison of "land value" with original cost of land	______	______
Composition of company's assets	______	______
Company's line of business	______	______
Overall financial condition of company	______	______
Whether company's financial statements were audited by CPA	______	______
Other factors (please describe):		
________________________	______	______
________________________	______	______
Did not consider reasonableness at all	______	

5. Did your desire to perform well in undertaking a challenging task cause you to try very hard in this study?

1	2	3	4	5	6	7
definitely yes	yes	probably yes	don't know	probably no	no	definitely no

6. Did you enjoy making the decisions required in this study?

1	2	3	4	5	6	7
definitely yes	yes	probably yes	don't know	probably no	no	definitely no

ADDITIONAL QUESTIONS

page 3

7. Are you sstisfied with your performance in the study?

1----------2----------3----------4----------5----------6----------7

definitely yes	yes	probably yes	don't know	probably no	no	definitely no

8. Did you feel tense during the study?

1----------2----------3----------4----------5----------6----------7

definitely yes	yes	probably yes	don't know	probably no	no	definitely no

9. Did your desire to cooperate with the researcher cause you to try very hard?

1----------2----------3----------4----------5----------6----------7

definitely yes	yes	probably yes	don't know	probably no	no	definitely no

10. Did you enjoy the overall experience of participating in the study?

1----------2----------3----------4----------5----------6----------7

definitely yes	yes	probably yes	don't know	probably no	no	definitely no

11. Did your desire to contribute to research knowledge cause you to try very hard?

1----------2----------3----------4----------5----------6----------7

definitely yes	yes	probably yes	don't know	probably no	no	definitely no

12. Indicate how realistic or representstive this study was in comparison to your work:

1---------------2---------------3---------------4---------------5

highly unrepresentstive	not representative	moderately representative	representative	very representative

13. What is your age? ______________

14. How long have you been a credit analyst? _________________

15. What is your highest level of college?
Bachelors______/ Some graduate work______/ Masters______/

BIBLIOGRAPHY

Agresti, A., and B. F. Agresti, Statistical Methods for the Social Sciences (San Francisco: Dellen Publishing Company, 1979).

Barlev, B., "Contingent Equity and the Dilutive Effect on EPS," The Accounting Review (April 1983), Vol. 58, No. 2, pp. 385-393.

Birnbaum, M. H., and S. E. Stegner, "Source Credibility in Social Judgment: Bias, Expertise, and the Judge's Point of View," Journal of Personality and Social Psychology (January 1979), Vol. 37, No. 1, pp. 48-74.

Butterworth, J., "The Accounting System as an Information Function," Journal of Accounting Research (Spring 1972), Vol. 10, No. 1, pp. 1-27.

Demski, J. S., "Choice Among Financial Reporting Alternatives," The Accounting Review (April 1974), Vol. 49, No. 2, pp. 221-232.

Dittrich, N. E., Accounting Implications of the Relative Objectivity of the Appraisal Process, Ph.D. Dissertation, Ohio State University, 1966.

Fama, E. F., "Agency Problems and the Theory of the Firm," Journal of Political Economy (April 1980), Vol. 88, No. 2, pp. 288-307.

Fellingham, J. C., and D. P. Newman, "Monitoring Decisions in an Agency Setting," Journal of Business Finance & Accounting (Summer 1979), Vol. 6, No. 2, pp. 203-221.

Feltham, G. A., "The Value of Information," The Accounting Review (October 1968), Vol. 43, No. 4, pp. 684-696.

Financial Accounting Standards Board (FASB), Statement of Financial Accounting Concepts No. 1, Objectives of Financial Reporting by Business Enterprises (Stamford, Conn.: FASB, November 1978).

Financial Accounting Standards Board (FASB), Statement of Financial Accounting Concepts No. 2, Qualitative Characteristics of Accounting Information (Stamford, Conn.: FASB, May 1980).

Gjesdal, F., "Accounting for Stewardship," *Journal of Accounting Research* (Spring 1981), Vol. 19, No. 1, pp. 208-231.

Gomaa, I. I., *Information Inductance in a Transfer Price Setting*, Ph.D. Dissertation, University of Florida, 1982.

Gonedes, N. J., "Information Production and Capital Market Equilibrium," *The Journal of Finance* (June 1975), Vol. 30, No. 3, pp. 841-864.

Green, P. E., P. J. Robinson, and P. T. Fitzroy,"The Valuation of Survey Information as a Function of Reliability and Cost," in *Experiments on the Value of Information in Simulated Marketing Environments* (Boston: Allyn and Bacon, 1967), pp. 64-84.

Hilton, R. W., R. J. Swieringa, and R. E. Hoskin, "Perception of Accuracy as a Determinant of Information Value," *Journal of Accounting Research* (Spring 1981), Vol. 19, No. 1, pp. 86-108.

Hirshleifer, J., "The Private and Social Value of Information and the Reward to Inventive Activity," *The American Economic Review* (September 1971), Vol. 61, No. 4, pp. 561-573.

Hogarth, R. M., "Beyond Discrete Biases: Functional and Dysfunctional Aspects of Judgmental Heuristics," *Psychological Bulletin* (September 1981), Vol. 90, No. 2, pp. 197-217.

Hovland, C. I., I. L. Janis, and H. H. Kelley, *Communication and Persuasion* (New Haven, Conn.: Yale University Press, 1953).

Hovland, C. I., and W. Mandell, "An Experimental Comparison of Conclusion Drawing by the Communicator and by the Audience," *Journal of Abnormal and Social Psychology* (July 1952), Vol. 47, No. 3, pp. 581-588.

Ijiri, Y., *Theory of Accounting Measurement*, Studies in Accounting Research #10 (Sarasota, Fla.: American Accounting Association, 1975).

________, and R. K. Jaedicke, "Reliability and Objectivity of Accounting Measurements," *The Accounting Review* (July 1966), Vol. 41, No. 3, pp. 474-483.

Jensen, M. C., and W. H. Meckling, "Theory of the Firm: Managerial Behavior, Agency Costs and Ownership Structure," *Journal of Financial Economics* (October 1976), Vol. 3, No. 4, pp. 305-360.

Joyce, E. J., and G. C. Biddle, "Anchoring and Adjustment in Probabilistic Inferences in Auditing," Journal of Accounting Research (Spring 1981a), Vol. 19, No. 1, pp. 120-145.

________, ________, "Are Auditors' Judgments Sufficiently Regressive?," Journal of Accounting Research (Autumn 1981b), Vol. 19, No. 2, pp. 323-349.

Joyce, E.J., R. Libby, and S. Sunder, "Using the FASB's Qualitative Characteristics in Accounting Policy Choices," Journal of Accounting Research (Autumn 1982), Vol. 20, No. 2, pp. 654-675.

Kahneman, D., and A. Tversky, "Prospect Theory: An Analysis of Decision under Risk," Econometrica (March 1979), Vol. 47, No. 2, pp. 263-291.

Kelman, H. C., and C. I. Hovland, "'Reinstatement' of the Communicator in Delayed Measurement of Opinion Change," Journal of Abnormal and Social Psychology (July 1953), Vol. 48, No. 3, pp. 327-335.

Magee, R. P., and J. W. Dickhaut, "Effects of Compensation Plans on Heuristics in Cost Variance Investigations," Journal of Accounting Research (Autumn 1978), Vol. 16, No. 2, pp. 294-314.

Marshall, J. M., "Private Incentives and Public Information," The American Economic Review (June 1974), Vol. 64, No. 3, pp. 373-390.

May, G. O., Financial Accounting (New York: The Macmillan Company, 1943).

McCaslin, T. E., An Empirical Investigation of the Alleged Trade Off Between Relevance and Reliability, Ph.D. Dissertation, University of Tennessee, 1982.

Mendenhall, W., Introduction to Linear Models and the Design and Analysis of Experiments (Belmont, Cal.: Duxbury Press, 1968).

Paton, W. A., and A. C. Littleton, An Introduction to Corporate Accounting Standards (Chicago: American Accounting Association, 1940).

Prakash, P., and A. Rappaport, "Information Inductance and Its Significance for Accounting," Accounting, Organizations, and Society (1977), Vol. 2, No. 1, pp. 29-38.

Rosenbaum, M. E., and I. P. Levin, "Impression Formation as a Function of Source Credibility and Order of Presentation of Contradictory Information," Journal of Personality and Social Psychology (1968), Vol. 10, No. 2, pp. 167-174.

Ross, S. A., "The Economic Theory of Agency: The Principal's Problem," The American Economic Review (May 1973), Vol. 63, No. 2, pp. 134-139.

Statistical Analysis System (SAS) Institute, SAS User's Guide, 1979 Ed. (Cary, N. C.: SAS Institute Inc., 1979).

Snapper, K. J., and C. R. Peterson, "Information Seeking and Data Diagnosticity," Journal of Experimental Psychology (March 1971), Vol. 87, No. 3, pp. 429-433.

Stanga, K. G., "The Relationship Between Relevance and Reliability: Some Empirical Results," Accounting and Business Research (Winter 1980), Vol. 11, No. 41, pp. 29-39.

Tversky, A., and D. Kahneman, "Judgment under Uncertainty: Heuristics and Biases," Science (27 September 1974), Vol. 185, No. 4157, pp. 1124-1131.

________, ________, "The Framing of Decisions and the Psychology of Choice," Science (30 January 1981), Vol. 211, No. 4481, pp. 453-458.

Waller, R. A., and D. B. Duncan, "A Bayes Rule for the Symmetric Multiple Comparison Problem," Journal of the American Statistical Association (December 1969), Vol. 64, No. 328, pp. 1484-1499.

Watts, R. L., "Corporate Financial Statements, A Product of the Market and Political Processes," Australian Journal of Management (April 1977), pp. 53-75.

Wilner, N. A., "SFAS 8 and Information Inductance: An Experiment," Accounting, Organizations, and Society (1982), Vol. 7, No. 1, pp. 43-52.

Wixon, R. W., W. G. Kell, and N. M. Bedford, Accountants' Handbook, 5th ed. (New York: The Ronald Press Company, 1970).

BIOGRAPHICAL SKETCH

Thomas L. Barton was born November 16, 1949, in Jacksonville, Florida. After attending elementary and secondary schools in Jacksonville, he enrolled in the University of Virginia. He graduated from there in 1971 with a Bachelor of Science in Commerce degree, concentrating in accounting. Mr. Barton received a Master of Arts degree in accounting from the University of Florida in 1972. He received the designation of Certified Public Accountant in 1972.

During the 1970's, Mr. Barton taught for three years at the University of Virginia as a lecturer and was controller of a construction equipment distributor in Jacksonville for four years. In 1976, he married Harriet McPherson of Jacksonville.

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Mr. Barton is currently Assistant Professor of Accounting at the University of North Florida in Jacksonville.

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

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Associate Professor of Accounting

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E. Michael Bamber
Assistant Professor of Accounting

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

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This dissertation was submitted to the Graduate Faculty of the School of Accounting in the College of Business Administration and to the Graduate School, and was accepted as partial fulfillment of the requirements for the degree of Doctor of Philosophy.

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